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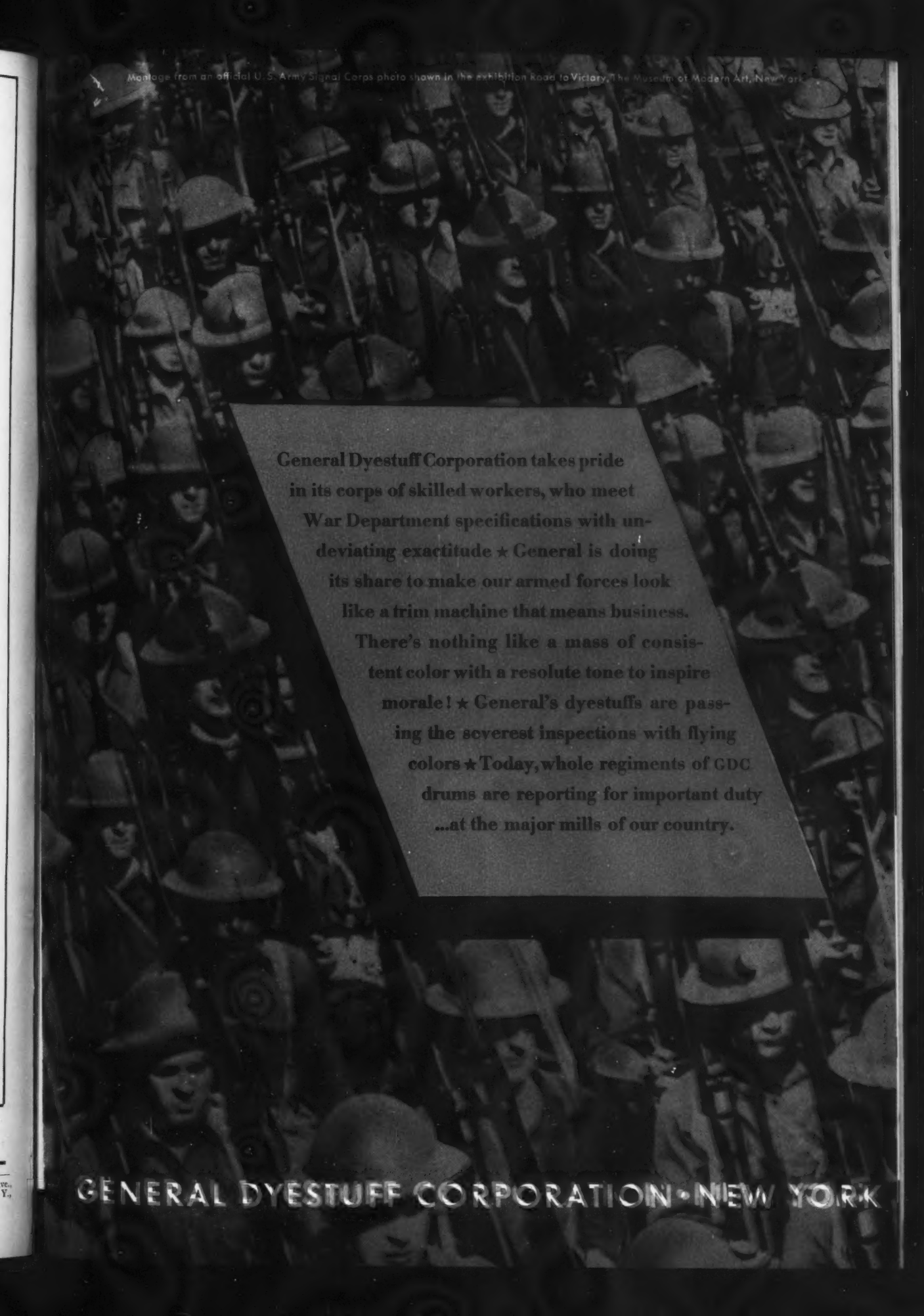
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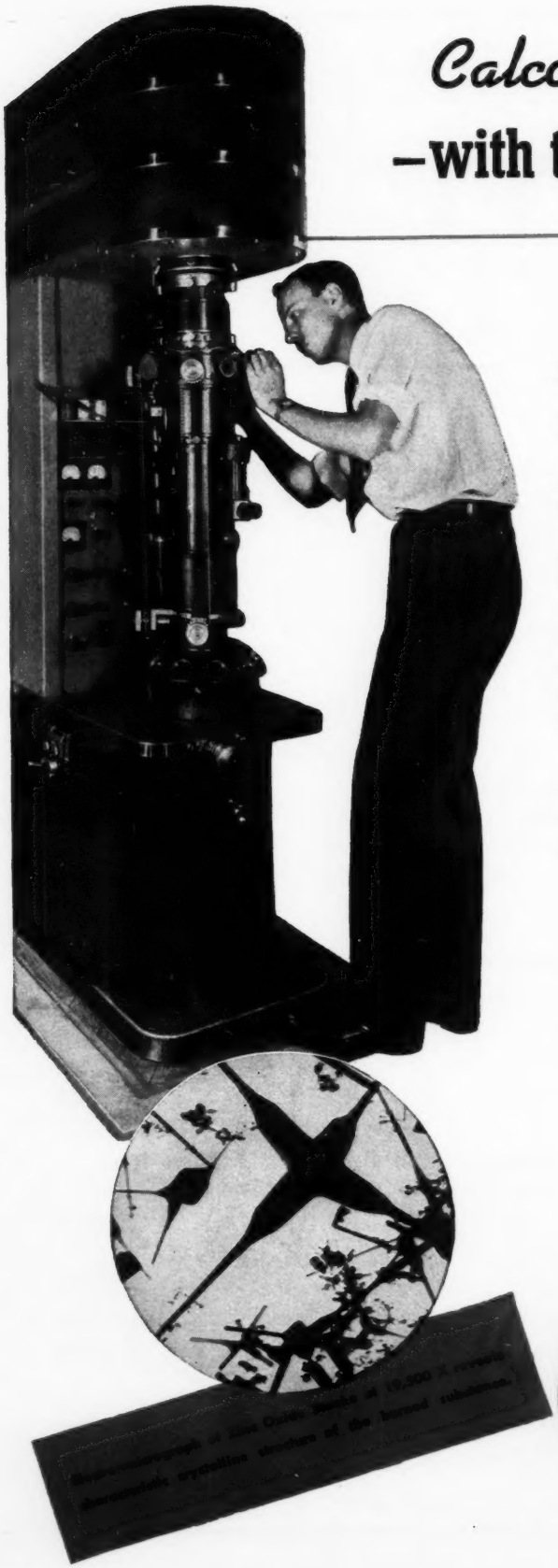

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VOLUME 31 AUGUST 31, 1942 NUMBER 18

Fractionation of CELLULOSE ACETATE

ARNOLD M. SOOKNE*, HENRY A. RUTHERFORD*, H. MARK** and MILTON HARRIS*

ABSTRACT

It is generally recognized that cellulosic materials are composed of long, unbranched, chain-like molecules of varying lengths. That the length of these molecules exerts an important influence on the physical properties of films and filaments is well known, but the exact nature of the relationship is still unclear. As part of a general program for the investigation of the mechanical properties of textile fibers, Research Associates for the Textile Foundation at the National Bureau of Standards are studying the dependence of the physical properties of cellulose acetate on the chain length of its molecules. A necessary preliminary to this study is the preparation of a large quantity of material carefully fractionated with respect to chain-length.

The present report is limited to a description of the separation of a sample of commercial cellulose acetate into fifteen fractions which vary more than tenfold in chain-length, by a process involving three successive fractionations. The method of separation and some of the characteristics of the fractions are given. It has been shown that a large proportion of the ash and haze-producing materials of the entire starting material is removed in the first fraction, which suggests that an improvement in the clarity of cellulose acetate films might be effected by a rough fractionation to remove a small portion of the starting material.

I. INTRODUCTION

IT is generally recognized that cellulose and its derivatives are composed of long, unbranched, chain-like molecules of varying lengths. The recognition of these facts has led to a number of investigations, reviewed elsewhere[1, 2], concerning the relation of chain-length to certain mechanical properties. In most of these studies, a quantity of cellulosic material was fractionated with respect to chain length, and the mechanical properties of the fractions were then investigated. It appears, however, that much of this earlier work has been handicapped by the lack of a sufficient quantity of the fractionated materials to allow them to be satisfactorily characterized. In addition, with few exceptions, the fractionations have consisted in a division of the material into a very few portions, without adequate repeated separations. In order to overcome such shortcomings, the fractionation of a large quantity of cellulose acetate was undertaken, and the mechanical properties of the various fractions and their blends were studied. The present report is limited to a description of the separation and a few of the characteristics of the fractions.

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II. EXPERIMENTAL PROCEDURE

1. Materials

The starting material was 150 liters of a filtered solution of commercial cellulose acetate of the type used in rayon manufacture*. It contained 2.5 per cent of cellulose acetate, 95.5 per cent of acetone, and 2.0 per cent of water by weight. The acetate had an Eastman viscosity of 93 seconds in 4:1 acetone solution[3], a precipitation value of 68.8 per cent[3], a melting point of 250° C, and a char point of 301° C. The acetyl and ash contents were 38.6 per cent and 0.06 per cent, respectively.

2. Methods

a. Estimation of relative chain-length

The relative degrees of polymerization† (henceforth

*We are indebted to the Tennessee Eastman Corporation for furnishing us with this material.

†By degree of polymerization is meant the average number of glucose residues per chain. The calculated molecular sizes have been expressed as D.P. values in this paper as a matter of convenience; D.P. values are directly converted to molecular weights by multiplying by the equivalent weight, in this case, 260. Because of the limitations of the method of determining them[4, 5], the D.P. values should be considered as relative values.

referred to as D.P.) of the starting materials and the various fractions were estimated viscometrically by the use of Staudinger's relationship D.P. $= \frac{\eta_{sp}}{K_m C}$ [6] where η_{sp} is the specific viscosity, K_m is Staudinger's constant of proportionality, C is the concentration in grams of solute per liter of solution, and D.P. is the degree of polymerization.

The specific viscosities were measured of solutions containing 2.64 g. of cellulose acetate per liter of solution at temperatures of 25.1° C. and 60.6° C, with Methyl Cellosolve (ethlyene glycol mono-methyl ether) as the solvent. Staudinger constants of 9.7×10^{-4} and 7.0×10^{-4} were used for calculating the results at 25.1° C. and 60.6° C, respectively. These constants were obtained from Staudinger's value for the constant at 20°C. [6] using the assumption that the molecular weight of a given sample is the same at all three temperatures. The D.P. values reported below are the means of the values obtained by measurements at 25.1° and 60.6° C.

b. Estimation of acetyl content

The acetyl contents of the samples were estimated by the method of Eberstadt, according to the recommendations of Genung and Mallatt[7]. The samples were first ground in a Wiley mill, to promote intimate contact between the sample and the solution.

c. The fractionation procedure

The fractional precipitation technique was used in preference to other fractionation procedures since the method appears to be as effctive as others, and much more convenient. On the basis of the results of preliminary experiments, 95 per cent ethyl alcohol was chosen as the precipitant. The general procedure was to add a quantity of ethyl alcohol insufficient to cause a permanent precipitate to a solution of cellulose acetate at room temperature (20° C.-25° C.) contained in a 5- or 10-gallon bottle. The concentration of acetate after the addition of alcohol was 1.2 per cent or less throughout the first fractionation. The precipitate initially formed by high local concentrations of alcohol was dissolved by stirring until a homogeneous solution was obtained. The vessel was then slowly cooled to a temperature of 10° C. A gelatinous precipitate slowly formed in the bottom of the vessel, the quality of the precipitate being such that the supernatant solution could be easily removed by decantation. The attainment of equilibrium was hastened by occasional stirring, and by scratching the bottles. That the process is a reversible one was shown by the fact that the precipitate could readily be redissolved and a homogeneous solution obtained by warming the system to room temperature. The supernatant solution was separated from the precipitate by decantation, and an additional quantity of alcohol was added to the solution. The process described above was then repeated until the desired number of fractions was obtained. The quantity of alcohol to be added was determined in each case by a preliminary test-tube experiment, after which the test sample was returned to the solution.

With the possible exception of the precipitate obtained by the first addition of alcohol, for which no estimate of the D.P. could be obtained (see Section III), materials of high molecular weight were precipitated first by this procedure, and successive additions of alcohol precipitated materials of lower molecular weight in a progressive manner.

The acetate solution was divided into 3 portions of about 50 liters each, and each of these was then treated so as to obtain 7 fractions of roughly equal weights. In each case the first fraction was not completely soluble in acetone. These first fractions, which will be described below, were combined and set aside. Fractions of approximately equal D.P.'s among the remaining fractions were combined to give 7 mixtures which were then refractionated to yield a total of 29 fractions. The concentration of acetate after the addition of alcohol was 5 per cent or less in this and the subsequent fractionation. Fractions of similar D.P. were again combined to 7 mixtures which were again split into a total of 28 fractions. The fractions of approximately equal D.P. were finally combined into 14 fractions which will be described below.

III. RESULTS AND DISCUSSION

The results of the complete fractionations, with the exception of the first fractions, are shown in Table 1. The

TABLE 1

Results of three successive fractionations of a cellulose acetate sample

First Fractionation			*Second Fractionation*			*Third Fractionation*		
D.P.	*Weight-percent*	*I(P)*	*D.P.*	*Weight-percent*	*I(P)*	*D.P.*	*Weight-percent*	*I(P)*
81	9.9	5.0	52	5.6	2.8	24	1.8	0.9
88	7.5	13.7	56	6.2	8.7	37	0.9	2.3
95	4.5	19.7	94	6.1	14.9	67	6.6	6.0
110	8.8	26.3	95	2.4	19.1	78	8.4	13.5
137	7.0	34.2	105	1.8	21.2	80	2.1	18.8
143	3.2	39.3	107	7.0	25.6	111	8.5	24.1
145	10.7	46.3	136	6.4	32.3	131	4.3	30.5
146	6.9	55.1	136			140	2.7	34.0
149	2.9	60.0	139	4.4	37.7	149	3.5	37.1
184	3.3	63.1	140	5.7	42.8	151	4.7	41.2
228	6.0	67.7	157	2.6	46.9	162	3.9	45.5
229	5.2	73.3	158	2.4	49.4	166	5.5	50.2
245*	7.7	79.8	172	1.2	51.2	185	1.7	53.8
245			175	2.4	53.0	189	1.2	55.2
277	7.0	87.1	187	4.5	56.5	193	4.9	58.3
284	6.6	93.9	192	5.7	61.6	213	4.3	62.8
290	3.0	98.7	203	2.2	65.5	214	3.3	66.7
			211	2.2	67.7	238	2.4	69.5
			215	3.6	70.6	241	2.9	72.2
			216	0.6	72.7	263	3.4	75.3
			223	3.9	75.0	273	1.4	77.7
			234	2.7	78.3	291	4.9	80.9
			248	2.2	80.7	292	1.8	84.2
			253	4.1	83.9	298	4.4	87.3
			253			351	3.3	91.2
			270	3.9	87.9	361	2.9	94.3
			290	1.8	90.7	370	2.3	96.9
			332	4.9	94.1	397	1.9	99.0
			337	3.9	98.5			

*In a number of cases, two fractions of identical D.P. were obtained. The values for these fractions are combined in columns 2 and 3.

third column for each fractionation gives the value of the integral distribution function, I (P)[8] corresponding to each D.P. value given in the first columns. The values of I (P) were obtained as follows: to one-half of the weight-percentage of each fraction was added the sum of the weight-percentages of all of the fractions appearing above it in the table. The values of I (P) so obtained represent the total percentage of the entire material with D.P. values between unity and the D.P. under consideration*.

In Figure 1, the values of I (P) are plotted as ordinates against the corresponding D.P. values as abscissae, for each of the three fractionations. The integral weight distribution curves shown in this figure appear to show a slight displacement toward the higher D.P. values in the second and third fractionations as compared with the first. This is particularly noticeable at the upper end of the curves. It therefore appears that a precise estimation of the distribution of chain-lengths in the starting material can be obtained only by the use of a relatively thorough fractionation procedure. The improvement of the homogeneity of the individual fractions as the fractionation was continued was indicated by the fact that separation became increasingly difficult, because the size of the precipitate was increasingly more sensitive to the quantity of alcohol added.

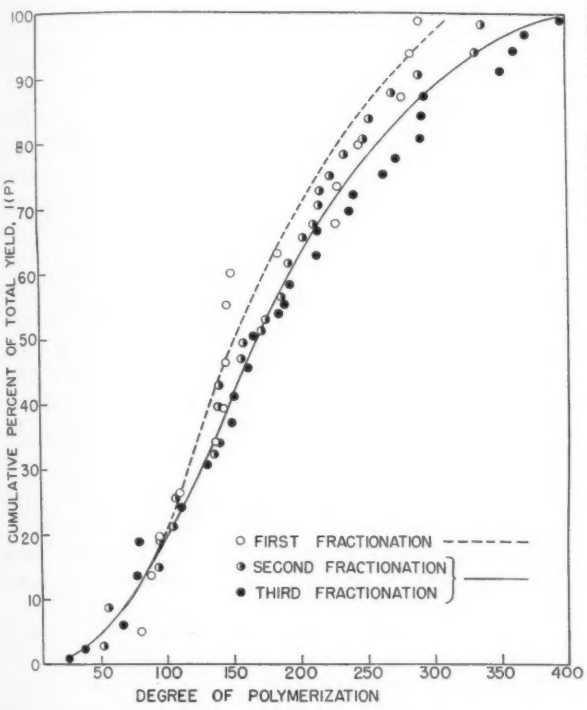

Figure 1—Integral weight-distribution diagrams, representing the results of the three fractionations of a cellulose acetate. The first fractions are omitted. The ordinates represent the cumulative percentages of the total yield included at a given D.P. For complete explanation see the text.

It must be pointed out that after the procedure described above, the fractions are not homogeneous; their homogeneity has, however, been greatly improved. Since relatively little further improvement is to be expected on continued fractionation beyond this point[8], the present experiments were limited to three fractionations.

The differential distribution curve shown in Figure 2 was obtained from the smooth integral weight distribution curve for the second and third fractionations (solid line, Fig. 1). The tangents to this smooth curve (estimated graphically) are plotted as the ordinates in Figure 2, against the corresponding D.P. values as the abscissae. Since the material in the first fraction is not included for reasons discussed below, the distribution of chain-lengths in the starting material is not precisely represented. The inclusion of this fraction would raise the curve slightly in the region of higher D.P.'s.

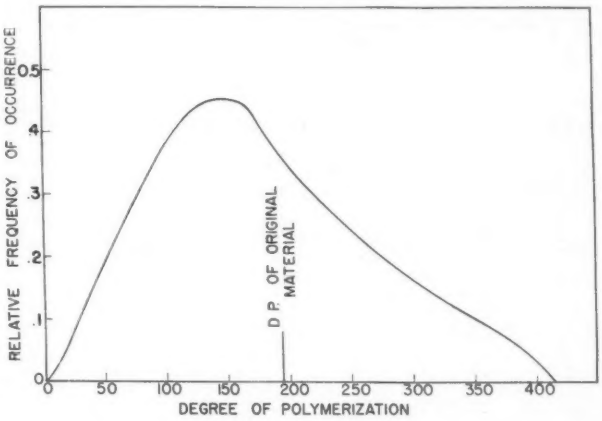

Figure 2—Differential distribution curve for the cellulose acetate used in this work. The first fractions are omitted.

In marked contrast with the other fractions, the first fraction precipitated in a fibrillar form, which after centrifuging or long standing acquired gel-like properties. The precipitate was not completely soluble in acetone or Methyl Cellosolve, and for this reason, an estimate of its D.P. was not obtained. This fraction contained a large proportion of the ash (see Table 1) and the haze-producing materials of the entire starting material, which is in agreement with the results of other investigators[1, 9, 10]. Films and solutions prepared from this fraction were characterized by their very bad haziness, in contrast with those prepared from the other fractions. These results suggest that an improvement in the clarity of films might be effected by a rough fractionation to remove a small percentage of the starting material. Spectroscopic analysis indicated that the ash consisted principally of calcium, and to a lesser extent of magnesium, iron, aluminum, and zinc. In addition, the first fraction contained 0.11 per cent of SO_4.

*This procedure for obtaining I (P) involves the assumption that the chain-lengths in any fraction are symmetrically distributed about the average chain-length of the fraction[8].

Further examination of this material indicated that it could be separated into an acetone-soluble fraction, a chloroform-soluble fraction, and a fraction which was insoluble in both solvents. It is of interest to note that the last of these fractions contained a large proportion of the total ash.

The properties of the remaining fractions are shown in Table 2. With the exception of the first fraction, the ash

TABLE 2

Properties of the starting material and the fractions of cellulose acetate

Fraction	*Specific viscosity 25.1° C.*	*Specific viscosity 60.6° C.*	*Degree of Polymerization*	*Acetyl content*	*Ash content*	*Melting point**
				percent	*percent*	*°C.*
Starting material	0.498	0.362	194	38.6	0.06	250
1	.....	.....	...	38.6	.33	...
2	1.019	.687	380	38.5	.06	255
3	0.921	.626	345	38.5	.03	253
4	.770	.531	291	38.5	.07	255
5	.699	.473	262	38.5	.07	255
6	.630	.428	236	38.3	.04	257
7	.550	.390	211	38.4	.03	254
8	.520	.347	194	38.5	.03	253
9	.429	.313	167	38.6	.03	248
10	.382	.271	146	38.5	.02	255
11	.335	.239	129	38.7	.02	247
12	.303	.223	118	38.6	.05	248
13	.197	.156	81	38.9	.02	246
14	.171	.128	68	39.0	.00	242
15	.074	.058	30	39.3	.04	237

*We are indebted to F. D. Pilgrim and W. O. Kearse of the Tennessee Eastman Corporation for making the melting point measurements reported in this table.

contents are in all cases very low. Similarly, with the exception of the three fractions of lowest D.P., the acetyl contents are also identical with that of the starting material within the experimental error. The somewhat high acetyl contents of these three fractions may be explained by the presence of an extra esterifiable hydroxyl group on the glucose residue on one end of each chain. The influence of this extra functional group is not noticeable except in the fractions of very low D.P., when it becomes an appreciable proportion of the total number of hydroxyl groups. The results therefore indicate that with the exception of the first fraction, the separation has apparently been primarily with respect to chain-length.

As a further means of characterizing the fractions, a number of solubility measurements were made, the results being shown in Figure 3. The procedure involved the titration with absolute ethyl alcohol of solutions of different concentrations of the acetate samples in acetone at 21° C. The weight composition of the solution when the first permanent cloud appeared is represented by a point on the diagram. The results indicate that a better separation can be obtained in dilute solutions, since the curves are more widely separated in the region of low concentrations. In addition, the wider relative separation of the curves for materials of lower D.P.'s indicates that more thorough fractionation would be expected for the materials of lower molecular weight. These results are consistent

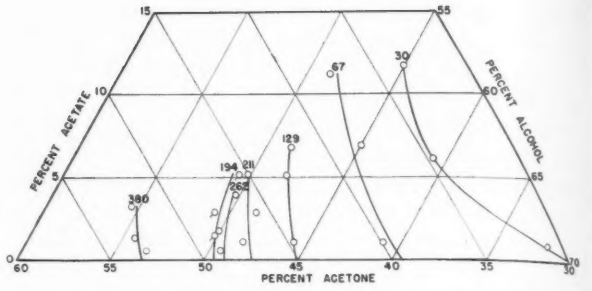

Figure 3—Phase diagram, showing some of the solubility relationships of the cellulose acetate and several of its fractions. Fractions, O; original material Q. For complete description see text. The number above each curve represents the D.P. of the material.

with the conclusions reached by Schulz on theoretical grounds[8, 11]. The curve for the starting material is, of course, displaced from the position that would be occupied by a fraction of corresponding average D.P., since it contains a large proportion of materials of high molecular weight. It is interesting to note, however, that this displacement is considerably less than might have been expected. Thus, the curve for the starting material might perhaps have been expected to fall near that for the fraction of D.P. 380, since some of this fraction is in the starting material. The fact that it does not, indicates that the presence of smaller chains apparently increases the solubility of the long chain material.

ACKNOWLEDGMENT

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The WASHING of Cotton Cellulose, Regenerated-Cellulose Rayon, Cellulose-Acetate Rayon, Silk, Wild Silk, and Wool with Soap, Silicated Soap and Sulfated Alcohol

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THE effect of repeated washing with 0.5 per cent neutral olive-oil soap in distilled water on undyed plain-woven cotton, regenerated-cellulose rayon, cellulose-acetate rayon, silk, wild silk, and wool, as compared with the effects of a silicated soap and a sulfated alcohol, has been studied through analysis of the original fabrics and their residues after ten, twenty, thirty, forty, and fifty washings[77, 46]. These fabrics (Table 1) were all analyzed[3] for weight (Table 2), absorption of light (Table 3), ash (Table 4), strength (Table 5), and shrinkage (Table 6); the cellulose-acetate rayon was also analyzed for acetyl (Table 7) and the wool for total sulfur (Table 9); the silks and wool were analyzed for nitrogen (Table 8) and moisture (Table 11) and the fabrics washed with sulfated alcohol and the wool washed with soap or silicated soap were analyzed for sulfate sulfur (Table 10).

The large loss in weight of the cotton and wild silk was due to removal of sizing. The increased weight of silk, and especially of wool, was much greater than that of the rayons and in the order of relative sorption of soap as observed by Woodmansey[79] and Neville and Harris[57] rather than that reported by Colt and Snell[14] as 19.5 for cotton, 11.1 for silk, and 7.6 for rayon. Alkali alkyl sulfates have been recommended for the weighting of proteic fibers[43] and Warwicke has described the sorption of 0.30 and 0.17 lb. of sodium cetyl sulfate by the same yardage, respectively, of wool serge and cotton[78].

The unbleached cotton and regenerated-cellulose rayon became whiter with the silicated soap than with soap. The fabrics washed with sulfated alcohol developed a green tint, more pronounced in proteic than in cellulosic fibers and traced to copper in the distilled water.

Residual ash of the cellulosic fibers decreased and that of the proteic fibers increased upon washing with each detergent; this rise in residual ash was greatest for wild silk and wool washed with silicated soap and least for wool washed with sulfated alcohol. The residual ash of the cotton and rayon quantitatively compared with that reported by Jackman and Howell[41] and Imhausen[40] but was much lower than described by Heermann and Sommer[37].

Wet strength of all the fabrics was lowered by washing but only the silk washed with sulfated alcohol and the wild silk lost more than half their wet strength during fifty washings, one criterion for the failure of a fabric in use[28]. Simola has reported the dry strength of cotton as lowered 16 per cent by 25 and 28 per cent by 50 washings in 10 g. of soap per liter[69]. The greater percental loss of wet strength by cotton, compared with the rayons, reflects the loss of sizing from the cotton, the high wet strength of the original cotton, and the low wet strength of the original rayons; however, the loss of wet strength by the rayons, which has been ascribed to impairment of micellar orientation during alternate swelling and drying[21], was surprisingly low.

The attack of the sulfated alcohol on silk, which resulted in a loss of 86 per cent of its wet strength during fifty washings, conspicuously contrasted with a loss of but 30 per cent brought about in this laboratory during fifty washings with a 0.2 per cent aromatic sulfonate (4 per cent organic sulfur and 60 per cent sodium sulfate) in hard water and was ascribable neither to acidity nor to inorganic salt[76]. Although the residual moisture of proteic fabrics washed with sulfated alcohol was lower than that of proteic fabrics washed with either soap, this difference probably does not account for the brittleness of the silk washed with sulfated alcohol. In contrast to the behavior of silk, wool lost 11 per cent of its wet strength during fifty washings with sulfated alcohol as compared to approximately 20 per cent with either soap.

With the exception of the woolen homespun, shrinkage of each fabric with different detergents varied no more than the deviations of the yarns per inch of fabric; the comparatively high warp shrinkage of the cotton, the filling shrinkage of the regenerated-cellulose and silk crepes, and the warp stretch of the silk and wool were due to relaxation while much of the change in area of the cellulose-acetate rayon was caused by its drying in hard creases. The long-fibered[72] plain-woven[42] woolen did not readily felt to a compact sheet at room temperature[33] although its filling shrinkage increased with the number of washings[34, 35, 20]; the somewhat lower shrinkage of the wool with the sulfated alcohol is in agreement with statements by Briscoe[12] and Franz[26] although sulfated alcohols have been recommended for the felting of wool[10].

The values for acetyl of the washed cellulose-acetate rayon suggested no change greater than experimental error. Ohl had noted that cellulose-acetate rayon decreased in strength more rapidly than in acetyl upon washing[62].

TABLE I

Physical Analysis of Fabric

Fabric	Weight of fabric	Thickness of fabric	Absorption of light by fabric	Ash of fabric	Length of fiber	Breaking Strength of fabric				Elongation of fabric at breaking load			
						Conditioned		Wet		Conditioned		Wet	
						Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
	ounces per square yard	inch	percentage	percentage of fabric	inch	pounds per inch	pounds per inch	pounds per inch	pounds per inch	percentage	percentage	percentage	percentage
1. Cotton cellulose	3.81 (0.02*)	0.0095	20 (0)	1.03	1.26	72 (4)	31 (2)	69 (1)	41 (1)	20	11	28	14
2. Regenerated-cellulose rayon.	2.87 (0.01)	0.0073	20 (0)	0.63	continuous	36 (4)	10 (0)	17 (1)	2 (0)	27	31	26	25
3. Cellulose-acetate rayon	2.88 (0.02)	0.0067	16 (1)	0.13	continuous	30 (1)	22 (0)	17 (1)	11 (1)	7	7	30	38
4. Silk	5.03 (0.01)	0.0097	26 (0)	0.28	continuous	43 (2)	44 (2)	40 (4)	46 (0)	44	62	51	96
5. Wild silk	1.45 (0.05)	0.0039	35 (0)	0.57	continuous	23 (1)	24 (0)	22 (1)	25 (1)	31	32	41	41
6. Wool	9.72 (0.06)	0.0188	30 (0)	0.19	3.24	40 (1)	34 (1)	26 (1)	22 (1)	53	45	74	63

*Mean deviations are within parentheses.

TABLE I (Continued)

Physical Analysis of Fabric

Fabric	Type of yarn		Distribution of yarns in fabric					Twist of yarn		Yarn number	
			By number		By weight						
	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
			number per inch	number per inch	percentage of fabric	percentage of fabric	number per inch, direction	number per inch, direction	typp	typp
1. Cotton cellulose	2-ply	single	125 (1*)	69 (0)	71.3 (0.2)	28 (0)	ply 11 (1) S single 11 (0) Z	10 (1) S	30.6 (0.1)	39.3 (0.6)
2. Regenerated-cellulose rayon	multifilament	crepe	100 (0)	50 (1)	73.5 (0.2)	27 (1)	< 1	58 (2) S 55 (1) Z**	29.5 (0.0)	36.2 (0.0) 36.2 (0.0)
3. Cellulose-acetate rayon	multifilament	crepe	183 (2) 262 (2)	61 (0) 63 (1)	60.5 (0.2) 41.0 (0.1)	39 (0) 58.9 (0.2)	< 1 < 1	< 1 45 (1) S	63 (0) 77 (3)	31.1 (0.2) 17.2 (0.5)
4. Silk	multifilament	crepe						46 (2) Z**		17.2 (0.5)
5. Wild silk	multifilament	multifilament	75 (0)	65 (0)	51 (0)	46 (1)	< 1	< 1	68 (0)	58 (2)
6. Wool	woolen	woolen	31 (0)	31 (1)	52.0 (0.5)	48.0 (0.8)	12 (0) Z	11 (0) Z	4.05 (0.05)	3.55 (0.04)

*Mean deviations are within parentheses.
**Two S-twisted yarns alternated in the fabric with two Z-twisted yarns.

The total nitrogen of the residual wild silk reflected its loss of non-nitrogenous sizing and that of silk or wool the increased weight of fabric.

The total residual sulfur of wool washed with soap or silicated soap was nearly constant while that of wool washed with sulfated alcohol increased with washing as did its sulfate sulfur. Lower and more nearly constant amounts of sulfate were sorbed from the sulfated alcohol by the silk and wild silk than by wool, none was taken up by the cellulosic fibers, and the wool washed with soap or silicated soap did not acquire any sulfate sulfur.

These data, which quantitatively describe a silicated soap as more destructive to wild silk but no more degrading than soap to cotton cellulose, regenerated-cellulose rayon, cellulose-acetate rayon, silk, and wool, fall in line with work which has supported the use of silicated soap as a textile detergent[29, 47, 53, 60, 61, 63, 59, 25, 44, 68, 24, 48] rather than with evidence[13, 66, 50, 22, 23, 80, 30, 51, 74, 36, 45, 58, 75, 31, 55, 11, 36, 8] which has been against this use of silicated soap.

EXPERIMENTAL PROCEDURE

Preparation of Fabrics

The unbleached cotton broadcloth, regenerated-cellulose rayon crepe, cellulose-acetate rayon faille taffeta, and wild silk pongee were cut with pinking shears into one-yard lengths for washing.

A silk crepe woven in the gum was boiled one hour in 100 volumes of 10 per cent neutral olive-oil soap, rinsed three times in water, and again put through this cycle of degumming and rinsing before it was boiled in three changes of water for fifteen minutes each with intermediate rinsings at room temperature, dried at room temperature and cut for washing.

A wool homespun containing 7.2 per cent naphtha-extractable material[16] but neither sulfite[27] nor selenium[17] was scoured fifteen minutes in eighty volumes of 0.5 per cent olive-oil soap at room temperature and rinsed in water for fifteen minutes; the scouring and rinsing were repeated twice and the wool was rinsed with water until the latter no longer foamed, dried at room temperature, and cut for washing.

TABLE II

Residual Weight of Washed Fabric

Fabric	Washing number	Silicated soap percentage of original fabric	Soap percentage of original fabric	Sulfated alcohol percentage of original fabric
1. Cotton cellulose	10	90	90	87
	20	91	89	89
	30	87	89	87
	40	88	87	88
	50	90	89	88
2. Regenerated-cellulose Rayon	10	102	102	101
	20	100	103	99
	30	102	102	98
	40	103	104	100
	50	103	104	100
3. Cellulose-acetate rayon	10	99	100	98
	20	98	99	98
	30	99	98	98
	40	100	97	99
	50	97	97	97
4. Silk	10	106	106	108
	20	106	107	105
	30	105	108	104
	40	105	107	106
	50	105	108	104
5. Wild silk	10	78	75	88
	20	79	79	77
	30	81	80	76
	40	74	79	83
	50	72	82	82
6. Wool	10	108	109	103
	20	108	110	109
	30	112	110	110
	40	112	109	111
	50	111	111	109

TABLE III

Light Absorbed by Washed Fabric

Fabric	Washing number	Silicated soap percentage	Soap percentage	Sulfated alcohol percentage
1. Cotton cellulose	0	20	20	20
	10	17	18	20
	20	17	18	20
	30	16	18	21
	40	16	18	21
	50	16	18	22
2. Regenerated-cellulose rayon	0	20	20	20
	10	19	20	27
	20	19	20	20
	30	16	19	20
	40	15	22	20
	50	16	24	*
3. Cellulose-acetate rayon	0	16	16	16
	10	12	13	13
	20	*	13	12
	30	*	12	13
	40	12	13	12
	50	12	13	12
4. Silk	0	26	26	26
	10	24	24	27
	20	22	25	30
	30	23	25	35
	40	23	24	34
	50	26	27	40
5. Wild silk	0	35	35	35
	10	50	52	49
	20	46	51	54
	30	47	50	55
	40	*	50	56
	50	*	48	56
6. Wool	0	30	30	30
	10	28	30	31
	20	28	*	37
	30	29	31	37
	40	31	31	38
	50	32	31	45

*Residual strips of fabric were too narrow to be measured with the reflectometer.

Washing of Fabrics

Each of the fabrics was washed separately by hand for five minutes at room temperature in fifty volumes of 0.5 per cent soap, silicated soap, or sulfated alcohol in distilled water (a volume in milliliters fifty times the weight in grams of the original fabric and containing 5 g. of detergent per liter of solution), rinsed in distilled water until foaming ceased, and dried in air and diffused light at room temperature before the next washing.

The olive-oil soap upon analysis yielded 98.3 ± 0.04 per cent anhydrous soap, 0.8 ± 0.1 per cent matter volatile at 105° C., 9.92 ± 0.04 per cent combined alkali, a titer of 12.9 ± 0.1° C., an acid number of 198.0 ± 0.3, no free alkali or free acid, and no alcohol-insoluble, unsaponified, or unsaponifiable matter.

The silicated soap, with a titer of 35.0 ± 0.0 C. and an acid number of 223.3 ± 0.4, contained 78.9 ± 0.2 per cent anhydrous soap, 3.7 ± 0.0 per cent matter volatile at 105° C., 9.08 ± 0.02 per cent combined alkali, 5.31 ± 0.04 per cent water-insoluble matter, 6.10 ± 0.06 per cent total silica, 1.28 ± 0.02 per cent alkaline silicate, and 15.41 ± 0.02 per cent alcohol-insoluble matter the aqueous extract of which was equivalent to 5.11 ± 0.08 per cent sodium oxide, but no free acid or free alkali and no unsaponified or unsaponifiable matter.

Analysis of the commercial sulfated alcohol described its composition as 4.6 per cent total organic sulfur (computed from 61.48 ± 0.15 per cent sulfuric acid-treated ash), 4.04 ± 0.04 per cent organic-sulfate sulfur, 1.75 ± 0.03 per cent ether-soluble matter, 46.75 ± 0.13 per cent alcohol-insoluble matter, and 48.0 per cent sodium sulfate (computed from organic-sulfate sulfur and 16.89 ± 0.03 per cent total sulfur).

Analysis of Soaps[71]

Values for anhydrous soap, matter volatile at 105° C., combined alkali, water-insoluble matter, alcohol-insoluble matter, and alkalinity of alcohol-insoluble matter are each the mean of three or more determinations with five-gram samples and are based on weight of air-dry soap. Each value for total silica or alkaline silicate of the silicated soap is the mean of two or more determinations with two-gram samples of air-dry soap. Each value for acid number is the mean of four or more determinations with two-gram samples of air-dry fat acids. Each value for titer is the mean of three determinations.

Analysis of Sulfated Alcohol[9]

a. *Alcohol-Insoluble Matter.* Five grams of this detergent were digested on a steam bath with 200 ml. of ethanol, filtered, washed with ethanol, dried at 105° C., and weighed. The value for alcohol-insoluble matter is

TABLE IV
Ash of Washed Fabric

Fabric	Washing number	Silicated soap percentage of fabric	Soap percentage of fabric	Sulfated alcohol percentage of fabric
1. Cotton cellulose ..	0	1.03 (0.02*)	1.03 (0.02)	1.03 (0.02)
	10	0.27 (0.01)	0.24 (0.02)	0.22 (0.00)
	20	0.25 (0.01)	0.26 (0.04)	0.24 (0.01)
	30	0.37 (0.05)	0.23 (0.02)	0.22 (0.01)
	40	0.25 (0.01)	0.31 (0.01)	0.16 (0.02)
	50	0.33 (0.02)	0.34 (0.00)	0.20 (0.01)
2. Regenerated-cellulose rayon	0	0.63 (0.00)	0.63 (0.00)	0.63 (0.00)
	10	0.29 (0.01)	0.19 (0.03)	0.24 (0.00)
	20	0.45 (0.01)	0.23 (0.03)	0.16 (0.02)
	30	0.32 (0.03)	0.25 (0.03)	0.07 (0.01)
	40	0.31 (0.05)	0.20 (0.04)	0.10 (0.02)
	50	0.35 (0.02)	0.25 (0.01)	0.12 (0.02)
3. Cellulose-acetate rayon	0	0.13 (0.01)	0.13 (0.01)	0.13 (0.01)
	10	0.11 (0.00)	0.04 (0.01)	0.12 (0.01)
	20	0.12 (0.01)	0.02 (0.01)	0.07 (0.00)
	30	0.13 (0.02)	0.02 (0.02)	0.11 (0.01)
	40	0.10 (0.03)	0.00 (0.00)	0.08 (0.01)
	50	0.06 (0.01)	0.08 (0.02)	0.06 (0.00)
4. Silk	0	0.28 (0.01)	0.28 (0.01)	0.28 (0.01)
	10	0.72 (0.01)	0.48 (0.02)	0.48 (0.02)
	20	0.66 (0.04)	0.37 (0.01)	0.53 (0.01)
	30	0.78 (0.08)	0.50 (0.02)	0.59 (0.01)
	40	0.59 (0.02)	0.60 (0.00)	0.63 (0.00)
	50	0.57 (0.01)	0.63 (0.04)	0.76 (0.02)
5. Wild silk	0	0.57 (0.01)	0.57 (0.01)	0.57 (0.01)
	10	1.19 (0.01)	0.94 (0.01)	0.43 (0.08)
	20	1.22 (0.03)	0.93 (0.04)	0.75 (0.01)
	30	1.26 (0.12)	0.74 (0.07)	0.72 (0.00)
	40	1.34 (0.08)	0.83 (0.02)	0.78 (0.05)
	50	1.27 (0.04)	0.97 (0.05)	0.96 (0.02)
6. Wool	0	0.19 (0.01)	0.19 (0.01)	0.19 (0.01)
	10	0.94 (0.01)	0.92 (0.03)	0.42 (0.03)
	20	0.89 (0.01)	0.85 (0.06)	0.54 (0.04)
	30	1.16 (0.04)	0.90 (0.02)	0.68 (0.06)
	40	1.35 (0.04)	0.72 (0.03)	0.35 (0.04)
	50	0.64 (0.05)	0.75 (0.02)	0.36 (0.02)

*Mean derivations are within parentheses.

TABLE V
Wet Warp Strength of Washed Fabric

Fabric	Washing number	Silicated soap percentage of original wet strength	Soap percentage of original wet strength	Sulfated Alcohol percentage of original wet strength
1. Cotton cellulose	10	76	70	73
	20	69	70	74
	30	71	66	74
	40	73	62	72
	50	64	61	72
2. Regenerated-cellulose rayon	10	87	85	94
	20	92	82	91
	30	89	81	82
	40	85	84	82
	50	86	78	78
3 Cellulose-acetate rayon	10	96	94	92
	20	94	90	93
	30	87	90	90
	40	82	90	84
	50	78	73	89
4. Silk	10	90	93	65
	20	95	90	52
	30	87	90	35
	40	93	90	27
	50	90	76	14
5. Wild silk	10	83	89	74
	20	62	73	61
	30	53	66	53
	40	39	48	39
	50	22	34	26
6. Wool	10	97	91	100
	20	93	87	93
	30	88	85	93
	40	81	79	91
	50	81	79	89

the mean of three determinations based on weight of air-dry detergent.

b. *Ethereal Extract.* A five-gram sample of air-dry detergent was extracted 24 hours with diethyl ether in a Soxhlet extractor and again weighed. The average of two determinations is reported.

c. *Organic-Sulfate Sulfur.* Fifty milliliters of 0.5 *N* hydrochloric acid and 2 g. of sulfated alcohol, neutral to Methyl Orange, were refluxed two hours on a boiling water bath; after the addition of 30 g. of sodium chloride and 20 ml. of diethyl ether the mixture was titrated against standard sodium hydroxide using methyl orange as indicator. The value for organic-sulfate sulfur is the mean of four determinations based on weight of air-dry detergent.

d. *Total-Sulfate Sulfur.* The total sulfate of the residual solution from determination of organic-sulfate sulfur was precipitated and weighed as barium sulfate; the average of two determinations is based on weight of air-dry detergent.

e. *Total Sulfur.* This value is the mean of three determinations with 0.3 g. of air-dry detergent according to the Parr Bomb method[65].

f. *Sulfuric Acid-Treated Ash.* Three five-gram samples of air-dry detergent were ignited at dull red heat in an electric muffle furnace, moistened with sulfuric acid, and ignited to constant weight.

Analysis of Fabrics

a. *Absorption of Light.* Each value reported for absorption of light is the mean of five readings with a *Pfaltz and Bauer Reflectometer Universal Model MU*[4].

b. *Acetyl.* Each value for acetyl is the mean of three determinations by the Eberstadt method[18, 19] and is based on weight of fabric dried at 105° C.

c. *Ash.* A three-gram sample of air-dry fabric was dried in a weighing bottle until constant at 105° C., transferred to a porcelain crucible, and ignited until constant at the dull red heat of an electric muffle furnace. Each value for ash is the mean of three determinations in which weighings were made with tares.

d. *Breaking Strength and Elongation at Breaking Load.* The original fabrics were tested for both warp and filling strength by the inch-strip method after one week at 65 ± 2 per cent relative humidity and 70 ± 2° F. and when wet; the washed fabrics were tested for wet warp strength. These determinations were made within two days with a *Scott Universal Tester* and autographic recorder[73, 4]. The mean strength per yarn of a raveled specimen was computed from ten determinations as a basis for change in strength upon washing.

e. *Distribution of Yarns by Number.* Each value is the mean of five counts[73, 4].

f. *Distribution of Yarns by Weight.* Each value is the mean of four determinations[4].

TABLE VI
Shrinkage of Fabric

Fabric	Washing number	Warp direction: Silicated soap percentage	Warp direction: Soap percentage	Warp direction: Sulfated alcohol percentage	Filling direction: Silicated soap percentage	Filling direction: Soap percentage	Filling direction: Sulfated alcohol percentage
1. Cotton cellulose	10	13	13	13	2	1	2
	20	10	13	13	2	2	1
	30	13	14	13	2	2	2
	40	12	13	13	3	3	2
	50	13	15	13	3	2	2
2. Regenerated-cellulose rayon	10	9	9	7	17	15	15
	30	11	9	9	17	15	15
	30	7	6	7	16	15	15
	40	6	8	8	15	16	13
	50	8	8	8	15	17	15
3. Cellulose-acetate rayon	10	8	10	6	4	6	8
	20	9	13	12	6	5	7
	30	10	16	14	8	5	5
	40	13	18	14	7	5	5
	50	14	18	16	5	5	5
4. Silk	10	*2**	*2*	*3*	8	8	8
	20	*3*	*2*	*2*	8	8	8
	30	*2*	*7*	*5*	8	8	8
	40	*5*	*3*	*3*	8	8	8
	50	*3*	*5*	*5*	8	8	8
5. Wild silk	10	4	6	4	4	3	4
	20	7	6	7	3	5	4
	30	6	4	6	4	4	4
	40	6	8	7	4	4	4
	50	4	2	6	3	5	4
6. Wool	10	*7*	*11*	*3*	3	*3*	0
	20	*7*	*7*	*7*	3	6	3
	30	*7*	*11*	*7*	9	11	0
	40	*7*	*7*	*7*	9	14	9
	50	*3*	*7*	3	16	14	11

*Stretch is shown by italics.

TABLE VII
Acetyl of Washed Cellulose-acetate Rayon

Washing number	Silicated Soap: percentage of washed fabric dried at 105° C.	Silicated Soap: percentage of original fabric**	Soap: percentage of washed fabric dried at 105° C.	Soap: percentage of original fabric**	Sulfated Alcohol: percentage of washed fabric dried at 105° C.	Sulfated Alcohol: percentage of original fabric**
0	38.59 (0.03*)		38.59 (0.03)		38.59 (0.03)	
10	39.06 (0.10)	38.7	39.17 (0.03)	39.2	39.10 (0.02)	38.3
20	39.02 (0.06)	39.2	39.22 (0.02)	38.8	39.10 (0.07)	38.4
30	39.02 (0.03)	38.6	39.23 (0.01)	38.4	39.10 (0.02)	38.3
40	39.23 (0.05)	39.2	39.27 (0.04)	38.1	39.21 (0.03)	38.8
50	39.22 (0.05)	38.0	39.27 (0.02)	38.1	39.21 (0.06)	38.0

*Mean deviations are within parentheses.
**Based on weight of washed fabric dried at 105° C. times ratio of conditioned weight of original fabric to conditioned weight of washed fabric.

g. *Length of Fiber.* A yarn longer than any of its individual fibers was untwisted to secure ten fibers which were measured to 1/16 in. with a linear steel scale.

h. *Moisture.* A sample of a residual silk or wool was conditioned at 65 ± 2° per cent relative humidity and 70 ± 2° F. for a week, weighed in a weighing bottle, and dried for two-hour periods at 105° to 110° C. until successive weighings checked within 0.0004 gram. The average loss in weight by two two-gram samples is expressed as percentage of moisture in conditioned fabric.

i. *Nitrogen.* Each value for total nitrogen of a silk or the wool is the mean of three determinations, with three-gram samples according to the Kjeldahl method, corrected by blank determinations and based on weight of fabric dried at 105° C.[32]

TABLE VIII
Total Nitrogen of Washed Silk, Wild Silk, and Wool

Fabric	Washing number	Silicated Soap percentage of fabric	Soap percentage of fabric	Sulfated Alcohol percentage of fabric
4. Silk	0	18.70 (0.02*)	18.70 (0.02)	18.70 (0.02)
	10	18.42 (0.05)	18.60 (0.04)	14.48 (0.04)
	20	18.57 (0.02)	18.42 (0.06)	18.28 (0.05)
	30	18.49 (0.02)	18.57 (0.04)	18.32 (0.02)
	40	18.56 (0.01)	18.54 (0.04)	18.28 (0.04)
	50	18.46 (0.04)	18.40 (0.05)	18.20 (0.04)
5. Wild silk	0	15.13 (0.19)	15.13 (0.19)	15.13 (0.19)
	10	18.03 (0.05)	18.51 (0.01)	17.99 (0.12)
	20	17.95 (0.03)	18.53 (0.01)	18.12 (0.04)
	30	17.99 (0.03)	18.48 (0.04)	18.29 (0.04)
	40	18.06 (0.04)	18.30 (0.01)	18.07 (0.06)
	50	18.03 (0.06)	18.50 (0.04)	18.11 (0.02)
6. Wool	0	16.54 (0.03)	16.54 (0.03)	16.54 (0.03)
	10	16.35 (0.04)	16.39 (0.02)	16.39 (0.05)
	20	16.40 (0.04)	16.48 (0.02)	16.24 (0.05)
	30	16.53 (0.02)	16.40 (0.05)	16.29 (0.03)
	40	16.33 (0.02)	16.47 (0.02)	16.04 (0.04)
	50	16.31 (0.03)	16.34 (0.01)	15.82 (0.09)

*Mean deviations are within parentheses.

TABLE IX
Total Sulfur of Washed Wool

Washing number	Silicated soap percentage of fabric	Soap percentage of fabric	Sulfated alcohol percentage of fabric
0	3.59 (0.01*)	3.59 (0.01)	3.59 (0.01)
10	3.57 (0.00)	3.52 (0.01)	3.66 (0.02)
20	3.58 (0.01)	3.58 (0.02)	3.75 (0.02)
30	3.59 (0.03)	3.56 (0.03)	3.75 (0.05)
40	3.53 (0.03)	3.52 (0.00)	3.90 (0.02)
50	3.53 (0.02)	3.54 (0.02)	3.97 (0.03)

*Mean deviations are within parentheses.

TABLE X

Sulfate Sulfur of Silk, Wild Silk and Wool Washed with Sulfated Alcohol

Washing number	*Silk percentage of fabric*	*Wild Silk percentage of fabric*	*Wool percentage of fabric*
0	0.00	0.00	0.00
10	0.14 (0.00*)	0.20	0.22 (0.01)
20	0.17 (0.01)	0.11	0.29 (0.02)
30	0.20 (0.01)	0.03 (0.03)	0.28 (0.01)
40	0.18 (0.02)	0.00	0.48 (0.02)
50	0.18 (0.03)	0.10 (0.01)	0.55 (0.02)

*Mean deviations are within parentheses.

j. *Shrinkage.* Warp shrinkage was computed from change in number of filling yarns and is expressed as percentage of filling yarns per inch of washed fabric. Filling shrinkage was computed from change in number of warp yarns.

k. *Sulfate Sulfur.* Each value for sulfate sulfur is the mean of three determinations with three-gram samples according to the Mease method[54]; each determination was corrected by blank determinations and based on weight of fabric dried at 105° C.

l. *Thickness of Fabric.* Ten measurements of thickness were made at different places in a fabric, exclusive of fabric within 6 in. of a selvage, with a micrometer which pressed on a circle of fabric 3/16 in. in diameter.

m. *Total Sulfur.* Each value for total sulfur of wool is the mean of three determinations, made with three-gram samples according to the Benedict-Denis method[7, 15, 16], corrected by blank determinations and based on weight of wool dried at 105° C.

Because the Benedict-Denis method, adapted to protein by Hoffman and Gortner[39] and to wool by Barritt[6], had been reported as yielding low results for methionine-containing protein[56, 64, 49, 67, 52], the unscoured wool, after three washings in benzene and six in distilled water, was also analyzed for total sulfur according to the Parr Bomb and the perchloric-acid methods. For this wool of 0.08 ± 0.01 per cent ash, 12.81 ± 0.12 per cent cystine (the mean of three determinations with half-gram samples according to 2), and 0.52 ± 0.01 per cent methionine (the mean of five determinations with half-gram samples according to 5) a mean value of 3.66 ± 0.01 per cent total sulfur was obtained with the Benedict-Denis method[7, 15, 16] and four-gram samples by each of two analysts making four and six determinations respectively. With the Parr Bomb method[65, 16] and half-gram samples means of 3.55 ± 0.01 and 3.52 ± 0.03 per cent were obtained for sets of five determinations by two analysts. The difference between these means is similar to that obtained by Donohue[16] but in reverse order to that obtained by Larose and Tweedie[49]. A mean of but 3.02 ± 0.05 per cent of sulfur resulted when one-gram samples of wool were analyzed according to the perchloric-acid method[70].

n. *Twist of Yarn.* Mean twist per inch of yarn was computed from ten determinations[1, 4].

o. *Weight of Fabric.* Three specimens, 4 in. long and the entire width of fabric, were conditioned for one week at 65 ± 2 per cent relative humidity and 70 ± 2° F. and weighed to the nearest milligram[73]. The mean length of a specimen was computed from five measurements; the mean width of the original fabric was determined in the same way but that of a washed fabric was computed from width of the original fabric and numbers of warp yarns per inch of original and washed fabrics. The mean weight was computed as ounces per square yard of original fabric.

TABLE XI

Moisture of Conditioned Silks and Wool

Washing number	*Fabric*	*Moisture* *Silicated soap* *Percentage of conditioned fabric*	*Soap* *percentage of conditioned fabric*	*Sulfated alcohol* *percentage of conditioned fabric*
0	Silk	8.46 (0.05*)	8.46 (0.05)	8.46 (0.05)
10		8.67 (0.02)	8.45 (0.03)	7.83 (0.07)
20		8.56 (0.08)	8.17 (0.02)	7.77 (0.08)
30		8.53 (0.04)	8.39 (0.03)	7.56 (0.01)
40		8.38 (0.01)	8.31 (0.18)	7.63 (0.05)
50		8.45 (0.04)	8.21 (0.04)	7.77 (0.01)
0	Wild silk	8.92 (0.09)	8.92 (0.09)	8.92 (0.09)
10		10.43 (0.11)	10.35 (0.14)	8.65 (0.07)
20		10.39 (0.01)	8.91 (0.08)	9.39 (0.02)
30		10.38	10.10 (0.07)	9.31 (0.02)
40		10.30 (0.07)	10.48 (0.03)	9.35 (0.07)
50		10.05 (0.08)	9.70 (0.46)	8.18 (0.30)
0	Wool	12.13 (0.02)	12.13 (0.02)	12.13 (0.02)
10		12.20 (0.01)	12.60 (0.01)	11.82 (0.04)
20		12.23 (0.02)	12.31 (0.05)	11.68 (0.06)
30		12.22 (0.03)	12.27 (0.10)	11.89 (0.02)
40		12.47 (0.04)	12.05 (0.15)	10.99 (0.00)
50		12.08	12.14 (0.04)	10.69 (0.06)

*Mean deviations are within parentheses.

p. *Yarn Number.* Four ten-yard or greater lengths of yarn were measured, conditioned, and weighed to the nearest milligram.

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Grateful acknowledgment is made to Dr. Lois Dale for determining residual moisture of fabrics and to Grace Anderson for washing the fabrics.

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PROCEEDINGS OF THE
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AUGUST 31, 1942

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Members should notify the **Secretary** immediately of all address changes.

AGEING OF SULFUR DYED TEXTILES

THE American Association of Textile Chemists and Colorists in its program of cooperation with the Government in the defense and war programs, has recently organized a committee to study the problem "Ageing of Sulfur Dyed Textiles." This project will include the development of a reproducible accelerated ageing test, to be used for predicting the ageing characteristics of the sulfur dyed materials. This problem is of considerable importance today due to the scarcity of suitable vat dyes.

This committee which is in close contact with the Quartermaster Depot at Philadelphia is composed of the following members: T. R. Smith, Wiscassett Mills, Chairman; A. H. Gaede, Laurel Soap Mfg. Co.; R. H. Souther, Proximity Print Works; J. L. Crist, Southern Dyestuff Corp.; O. G. Edwards, Avondale Mills; M. H. Klein, Sandoz Chemical Works; D. P. Knowland, Geigy Company; C. A. Seibert, E. I. du Pont de Nemours & Co.; J. R. Bonnar, General Dyestuff Corp.; Wm. R. Moorhouse, National Aniline Div. of Allied Chemical & Dye; H. G. Macdonald, Franklin Process Co.; F. M. Steadman, Major, Phila. Quartermaster Depot.

Report of A. S. A. Committee L-14 on COLOR FASTNESS OF TEXTILES as Presented at the F.T.C. Hearing in Washington, August 18, 1942

IN view of the short period of time, less than two weeks, that has elapsed since the distribution of the proposed Fair Trade Practice Rules of the Federal Trade Commission, there has been no opportunity to contact the full membership of the sectional committee of the American Standards Association on Fastness of Colored Textiles—L-14, representing as it does some 20 groups, as reported to the Commission at the meeting in April. A hurried survey of the committee resulted in the proposal to present to the Commission a comment today on the general aspects of the proposed rules followed by a detailed presentation of criticisms and suggestions on the proposed fair trade practices at the hearing to be held September 9 in New York.

The Commission will recall that the sectional committee of the ASA was asked by the Office of Price Administration to make recommendations on the color fastness terminology and suitable test methods, and these recommendations were presented at the April 10 hearing of the Commission. The proposed ruling which has just been issued is so at variance with the recommendations made to the Commission, not only by the American Standards Association committee but by other groups, that it seems obvious that a proper interval of time be allowed for considered comments and criticisms of this entirely new proposal.

Our committee wishes to bring before the Commission consideration of the following general principles with the thought that if a suitable period of time for discussion and criticism is permitted a fair trade practice will result which will bring about the desired goal of proper representation of the color fastness of textiles in use. It is generally understood that all of the groups represented on the sectional committee are in complete accord with the desire of the Commission to formulate suitable rules but are at the same time deeply concerned with the issuing of rules which may defeat the very purposes for which the rules are being issued. The general principles which we suggest to the Commission for consideration at this time are:

1. The question of the timeliness of a hurried effort on a fair trade practice on color fastness of textiles:

(a) Textile manufacturing for consumer use is largely subordinated and restricted because of the known efforts of manufacturers to produce material for the armed forces to help in winning the war in which we are engaged to the exclusion of any other consideration. Nothing should stand in the way of efforts of the technical personnel connected with these industries in the producing of material for the armed forces. A fair trade practice for color fastness is definitely an effort requiring time out of proportion to other major efforts in winning the war and should not be stimulated at this time. At the same time the relative importance of fair trade practice regulations is open to question since the development of new products has been so curtailed that the need for anything more than stabilization of the current picture is not demonstrated by the facts at hand.

(b) The untimeliness of a hurried effort on test methods such as those proposed is further emphasized by the need for a normal period of time for absorption of several new methods of test heretofore not applied to a large proportion of the textiles affected by the proposed fair trade practice rules. It would seem wise, therefore, as we respectively suggest that the Commission slow up its action on these rules until such a time as the war efforts of the industries affected permit reasonable consideration of the effect of the rules proposed on the reduced amount of products they are permitted to manufacture for consumer use. Furthermore, goods of considerable volume in the consumer trade will be affected for the first time by test methods never before applied to them in spite of the fact that these products have long given satisfactory consumer use. A few such products are carpets and rugs, blankets, and knitted outerwear.

(c) Preliminary examination of the proposed rules would seem to indicate that the rules cover a *wider* field of the textile industry than had been contemplated by the committee when it prepared its recommendations and submitted them to the Federal Trade Commission under date of April 7, 1942. This wider field, taking in as it does some branches of the textile industry that had not been previously affected by the question of color fastness, requires considerably more time for adequate study than is

permitted by the date set for this and the September 9th hearing.

It is our suggestion that the trade practice rules for color fastness be developed over a period of time consistent with our absorption in the war effort and the revolutionary character of the rules just presented to us.

Sectional Committee of American Standards Ass'n on Fastness of Colored Textiles.

MEETINGS, NORTHERN NEW ENGLAND SECTION

April Meeting

A MEETING of the Northern New England Section was held at the Hotel Manger, Boston, on Friday evening, April 10, 1942.

There were seventy-one members and guests present at the dinner and ninety-five attended the business and technical program which followed.

John N. Dalton, Chairman, announced the appointment of a Nominating Committee comprising John H. Grady, Edward B. Bell and Roland E. Derby.

Clarence L. Nutting, Councilor, stated that the Council, at its coming meeting, would consider the advisability of holding, this year, an Annual Meeting of the Association and asked for an expression of opinion from the Section. After an informal discussion a vote was taken, and of a fraction of the members voting there were seventeen votes against holding the Annual Meeting and ten votes in favor of it.

The technical session, arranged by Vice-Chairman Kenneth H. Barnard, was in the nature of a symposium on textile finishes. The first speaker was Dr. Edwin C. Dreby, formerly Director of Textile Research for Evaluation of Textile Finishes at the Bureau of Standards for the A. S. T. M., and now with Scholler Brothers, Philadelphia, Penna., who presented a paper on the subject: "Methods for the Evaluation of Textile Finishes."

This paper consisted of a description of the methods developed by the A. S. T. M., for the evaluation of flexural, frictional and compressional properties of fabrics. It covered such subjects as the "handle" of fabrics and the description and application of instruments devised to measure the effectiveness of different textile finishing processes.

The next speaker was Dr. E. R. Schwarz, Professor of Textile Technology at the Massachusetts Institute of Technology, who considered the subject: "Deformation in Textiles and Its Technical Importance." Dr. Schwarz summarized, in his usual breezy and incisive manner, the work done at the Massachusetts Institute of Technology under the A. A. T. C. C. Research Committee on the Evaluation of Textile Finishing Treatments and covered allied researches at Massachusetts Institute of Technology under the auspices of the Textile Foundation. Such subjects were considered as how fibers, yarns and fabrics behave in tension, torsion, compression and bending.

The papers were copiously illustrated by slides, moving pictures and actual instruments.

May Meeting

A meeting of the Northern New England Section was held at the Andover Country Club on Friday evening, May 10, 1942.

There were eighty-five members and guests present at the dinner and one hundred and five attended the business and technical program which followed.

At the business meeting, John N. Dalton, Chairman, called for the report of the Nominating Committee and John H. Grady, for the Committee, presented nominations for the coming year as follows:

Chairman: Edward S. Chapin.
Vice-Chairman: Delbert E. Ray.
Secretary: Azel W. Mack.
Treasurer: George O. Linberg.
Councilors: John N. Dalton, Harry M. Hartnett, Dexter R. Kneeland.
Sectional Committee: Joseph A. Bryant, Jr., Clifford G. Emmons, Tom Peel, J. Milton Washburn.

On motions from the members present, the report was accepted and the Secretary instructed to cast one ballot for the nominees, who were then declared duly elected. Chairman Dalton then appointed George Stewart to audit the Treasurer's report to be presented at the next meeting of the Section on June 5, 1942.

The Chairman then called attention to the fact that the retiring Treasurer, our "John" Grady, had served the Section in this capacity efficiently and faithfully for fifteen years. This remark called forth tumultuous applause from the audience, "John" blushing and responding with his usual graciousness and good humor.

Wallace P. Heintz, Chairman of the Outing Committee, announced that the Annual Outing would be held as usual, but, at the Andover Country Club because of the easy accessibility of Andover; and urged all to cooperate with the Committee in making the Outing an enjoyable occasion.

The technical portion of the evening was devoted to a consideration of union dyeing, and, the speaker of the evening, Mr. Henry E. Millson of the Calco Chemical Division of the American Cyanamid Company, who presented a paper on the subject: "Microscopic Observations of Union Dyeing." This was a new chapter of the studies of dyeing processes that Dr. George L. Royer and Mr. Millson have been conducting for some years with specially devised apparatus. After the presentation of the paper a lively discussion ensued. (The paper has since been published in the DYESTUFF REPORTER, issue of June 8, 1942, pages 278-291.

The Chairman then introduced F. Clarke Atwood, President of the Atlantic Research Associates, Inc., and Vice-President of Aralac, Inc., who assisted in a discussion covering the dyeing and processing of Aralac.

Respectfully submitted, EDWARD S. CHAPIN, *Secretary.*

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the American Dyestuff Reporter any vacancies which may occur in their business.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

NOTICE TO EMPLOYERS

Personal Histories and Employment Records of the following applicants are on file at the office of the American Dyestuff Reporter. Prospective employers may examine them without obligation.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE.

A-1

Education—Graduate textile chemistry and dyeing course, Lowell Textile Institute, 1932. Special course in colloid chemistry at M.I.T.

Experience—Library work in spare time while attending school; five years as assistant chemist with knitting mill, duties consisting of testing and grading silk, testing of oils, soaps, dyes, finishes and other chemicals, making up specifications for various lines of hosiery and checking finished product, keeping a check on production costs, control of waste and irregulars, checking competing products and carrying on research to improve product and reduce costs. Woman; age 30; references.

A-2

Education—B.T.C., Lowell Textile Institute, 1933.

Experience—Textile chemist, cotton and rayon thread; agricultural chemist, protein, fat and mineral analysis; special Federal inspector on textiles, New York City; U. S. inspector, war department; chemist-spotter, dry cleaning experience. Age 32; married.

A-3

Education—B.S. in chemistry, Lehigh University.

Experience—Experimental engineer and analytical chemist, 8 mos.; assistant superintendent of silk corporation, assisted in planning and directing production, in charge of laboratory, technical work, personnel, purchasing, etc., 2 years; inspector of ordnance material, to the present. Seeks position as chemical engineer or chemist.

Age 25; single; references.

A-B-9

Education—Textile School Graduate; Alexander Hamilton Institute Business Course.

Experience—Mature, executive type of textile chemist and colorist with over twenty years' broad general experience in factory, laboratory, purchasing and all around business procedure. Good correspondent. Excellent personality. Wholesome appearance. Fine speaker. Literary and artistic ability. Real color sense. Possesses fund of factual information about material things in a wide range of industries. Capable of meeting the highest type of clientele and planning and directing the efforts of all types of personnel. Desires supervisory, contact, promotional or sales work. Willing to prove ability and versatility.

Age 44; American born; New England Yankee ancestry; married.

A-B-17

Education—Graduate of Franklin Union and Lowell Textile Institute, 1942.

Experience—1936 until present as assistant dyer in hosiery dye works. Experienced on full fashioned and anklet hosiery, handling wool, cotton, silk, rayon and nylon and combinations; has charge of weighing dyestuffs, testing and shade matching; experience with hosiery dyeing machines of all sizes. Seeks position as assistant dyer or laboratory technician.

Age 24; married; references.

A-B-18

Education—Graduate Philadelphia Textile School, 1940.

Experience—Has experience as assistant chemist and trouble shooter in silk dyeing and finishing plant; as manager of laundry store; and as printer and colorist in screen printing plant. Seeks position in laboratory and research, dyeing, printing or finishing.

Age 21; single; references.

A-B-C-F-3

Experience—Broad experience since 1906 as overseer of finishing, general researcher, trouble shooter, overseer of dyeing, general superintendent, mill manager. Experienced in woolen, worsted, cottons, unions and mixtures. Recently specialized in men's wear cottons. Seeks position as overseer of finishing or dyeing, assistant superintendent, superintendent or manager.

Age 53, married; references.

A-C-D-1

Education—Chemistry, Temple College, Philadelphia, evenings. Dyeing and textile chemistry, Philadelphia Textile School.

Experience—Employed about 18 years in textile mill, becoming chemist; 5 years as superintendent of finishing on silk and rayon ribbons; 10 years as salesman of chemicals and textile specialties in eastern Pennsylvania and parts of New Jersey; has some knowledge of the processing of all textiles. Seeks position as salesman with well known company.

Age 48; married.

B-10

Education—2 years chemistry, 2 years textile chemistry and dyeing, Lowell Textile Institute, evenings.

Experience—4½ years dyeing and bleaching hosiery, specializing in children's and infants' hose; 3 years assistant dyer, dyeing and bleaching cotton, mercerized and unmercerized, wool, wool-cotton, wool-rayon and wool-silk hose. Seeks position as second hand, assistant dyer or laboratory assistant in hosiery mill.

Age 27; single; references.

B-D-1

Education—High school graduate; textile chemistry, Textile Evening High School, New York City; accounting; typist.

Experience—from 1935 to present employed as colorist with screen printing plant in New York City. Experienced with all types of fibers and all types of dyes. Shade matching. Versed in accounting, typing, modern office procedure and sales promotion. Able assistant to busy executive. Age 46; single; references.

C-1

Experience—Experienced as assistant finisher, finisher and superintendent of finishing since 1923. Experience on automobile cloth, boucle overcoatings, high grade men's wear worsted, low grade woolens, medium grade plaid-back overcoatings, fleece finish overcoatings, Bolivias, kerseys, medium-grade men's piece dye suitings, uniform cloth, flannels, ladies' dress goods and coatings, government serge and elastique fabrics, marine wool, flannel shirtings.

Age 37; married, 3 children; references.

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BOTH PATENT BILLS ARE BAD

TWO bills dealing with patents and patent rights are before committees of Congress, with the blessing of Assistant Attorney General Thurman Arnold. One is represented to be an indispensable war measure. The other proposes broad changes in the existing patent system declared to be so urgent that they cannot await the end of the war.

Either bill if enacted could be used to work the virtual destruction of existing patents and, if so used, would leave little or no incentive for private industry to carry on expensive scientific research.

The first (S-2303) is entitled "A bill to provide for the use of patents in the interest of national defense or the prosecution of war, and for other purposes." It authorizes the President, on his finding of war-time necessity to do so, to "grant a license to any person" to make or use any patented thing or process "upon such terms *and for such period of time* as the President may prescribe," provided only that he determine and prescribe reasonable royalty payment. (Italics supplied.)

Note that the life of the licenses so granted is not limited "to the duration" but only by the President's inclinations. Competent patent lawyers declare that such a law is wholly unnecessary and would contribute nothing to the war effort, for the reason that since 1910 the government is free in peace or in war to use any patented thing for its own purposes, the patentee's only recourse being to sue in the Court of Claims for compensation.

The other bill (S-2491) would apply new conditions to patents issued before or after its enactment. It authorizes the Commissioner of Patents, on his finding (1) that a patentee has failed for three years after issuance to "make, use and vend the invention or discovery" without reasonable justification for such failure, or (2) that there has been such failure and the patentee has refused for a period of three years after issuance to grant a license under his patent to any other person for compensation, then the Commissioner "may order the patentee to make the invention or discovery available to the public" on such terms as the Commissioner may prescribe.

This section 2 of the bill is evidently an attempt to render unlawful the purchase and suppression of useful patents which might reduce the value of existing proprietary articles or processes. But it leaves an inventor but three years in which to bring his invention to the commercial stage or to solve problems of its production and application. After that period his rights are exposed to the discretionary interference of the Commissioner. The additional required findings, that the patentee's "failure" has resulted or may result in a violation of the anti-trust laws "or is otherwise detrimental to the public interest," obviously afford the honest inventor no reliable protection. Three years might be a sufficient development period in respect to many inventions; with many others so arbitrary a limitation would be fatal.

Further, the second bill prohibits the assignment of a patent or the grant of a license under a patent "upon or in connection with any condition, agreement or understanding . . . which would tend substantially to lessen competition or to create a monopoly unless such restriction is necessary to promote the progress of science or the useful arts."

To say the least of it, this is a vague standard of judgment as between what is and what is not a monopolistic tendency. Moreover, it confuses the purposes of patent law and anti-trust law. The express purpose of patents is to offer the inventor the incentive of a limited monopoly of the use of his brain-child and the resulting pecuniary benefits. If he or his assignee attempts to extend his limited monopoly beyond the intent of Congress as expressed in patent statutes, the courts can check him under existing law, as they have recently been doing.

Both bills are so loosely drawn and distribute such vaguely described powers as to suggest that their framers wish to make an end of the patent system and of the practice of scientific research by private industry. Quite likely existing patent law needs some revision but this kind of revision would be far worse than none.—*The Wall Street Journal.*

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• AUGUST ISSUE, TEXTILE RESEARCH

Determination of Resilience of Textiles by Compression Testing

Compression testing is a comparatively new approach to the problem of determining the ability of textile materials to withstand the demands of actual service, and to retain the air pockets so conducive to warmth. Such terms as "resilience" and "compressional recovery" are now being used to describe some characteristics of the material in question. The correct interpretation of results of such tests is of utmost importance today with the increasing use of new fibers, new construction, new finishes, and new uses.

Improved Tests for Rotting and Mildewing

A better understanding of the causes and mechanism of the deterioration of cellulose by fungi may lead to the development of better methods of inhibiting or preventing the growth of these organisms. Since present test methods vary widely, standard methods of evaluating this deterioration should be adopted. This article deals with experiments on the refinement of technique for testing the amount and rate of cellulosic decomposition.

Postwar Problems

The far-sighted business executive can not avoid a prudent consideration of what may come after the war. Many leading companies and organizations are already undertaking or planning research to enable them to be prepared for postwar problems. This article outlines some of the important studies being undertaken in this field.

* * *

Other features in the August issue include a description of the research laboratories of Interchemical Corporation. This corporation by the organizing of interrelated research has met the problem of preventing the shelving of ideas and of developments in one department, that have a possibility for practical application in another division of the corporation's activities.

Another article is an abstract of a report which describes the separation of a solution of cellulose into fifteen fractional parts. This is the first step in determining to just what extent the length of the molecules affects the strength, extensibility, flexibility, and other properties of cellulose acetate fibers and films.

• RECLAMATION, SOLVENTS AND OILS

A program for reclamation of millions of gallons of war-essential chemical solvents and oils was announced recently by the Conservation Division of the War Production Board.

In announcing the program, S. Donald Perlman, executive chemical director, Industrial Salvage Section, Conservation Division, pointed out that a wide variety of chemicals critically needed in the war effort are being wasted daily in both war and non-war industries.

It is estimated that over one billion pounds of solvents are now recovered annually. Close to double this amount could be recovered if cooperation of all producers were obtained.

Steps to speed up the reclamation program have already been taken and the Industrial Salvage Section has acquainted all users of solvents with the urgency of putting an end to waste in their plants. In order to make the fullest possible use of existing reclaiming facilities, a list of reclaiming plants in the country has been compiled and published for the first time. At the same time, a broad educational campaign on the need for reclaiming and recovering solvents has been under way throughout the industry and is showing satisfactory results.

• SYNTHETIC ORGANIC CHEMICALS, 1941

The United States Tariff Commission issued on August 18th a preliminary report on United States production and sales of synthetic organic chemicals in 1941. The report includes statistics of production and sales of coal-tar dyes, other finished coal-tar chemicals, and synthetic non-coal-tar organic chemicals.

The report shows that 1941 sales of all synthetic organic chemicals were valued at 724 million dollars, an increase of 50 per cent over 1940 sales, which were the highest on record. The value of sales of coal-tar finished products and intermediates was 60 per cent greater than in 1940, and that of sales of non-coal-tar synthetic organic chemicals 42 per cent greater.

Figures of production are considerably larger than those of sales because a large part of the total output of synthetic organic chemicals is consumed in further processing by the producing companies. In the more important groups, the increases in production in 1941 over 1940 were: Intermediates 25 per cent, dyes 32 per cent, coal-tar medicinals 64 per cent, coal-tar resins 50 per cent, and all non-coal-tar synthetic organic chemicals 27 per cent.

Statistics concerning coal-tar crudes, plasticizers, various pharmaceuticals, intermediates, and solvents (included in the reports for previous years) are omitted from the 1941 report to avoid disclosure of information that might aid the enemy.

Copies of the report may be obtained from the United States Tariff Commission, Washington, D. C., or from the Commission's office in the Custom House, New York, N. Y.

• ACRAWAX C

In replacing rubber as a cloth backing in the manufacture of raincoats, life belts, etc., the plastic material polyvinyl butyral has been used with considerable success. However, the characteristic surface tack of this material has to be eliminated without, of course, adversely affecting the other properties. It is claimed that it has been found that Acrawax C, a synthetic wax manufactured by the Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y., when added to the polyvinyl butyral in amounts as low as 1 per cent effectively eliminates this surface tack. Furthermore, Acrawax C is said to be a high melting point wax (275-280° F.), non-brittle, water insoluble and non-greasy. One per cent is said to be completely compatible with the plastic and show no signs of blooming to the surface. It is available in powdered form and therefore can be readily incorporated with the other compounding ingredients in the milling operation.

It is stated that Acrawax C is also being used as a waterproofing agent; in plastic molding powders; as a lubricant in the molding of sintered bearings; as a flexible insulating wax having a low dielectric; in the manufacture of polishes, etc. It is manufactured from domestic raw materials, and is available in all commercial quantities.

• D.C.A.T. MEETING

John J. Toohy, Manager of Distribution for E. R. Squibb & Sons Inc., and Chairman of the Drug, Chemical and Allied Trade Section's Program Committee announced today that a special luncheon meeting has been scheduled for Thursday, September 10th, 1942 at the Hotel Pennsylvania. Francis M. Shields, Chief of the Health Supplies Branch of the War Production Board will be the guest speaker.

Mr. Toohy in making the announcement said, "The Section will be greatly honored by the appearance of Mr. Shields, particularly so since he expects to bring Fred J. Stock, his Deputy Administrator, and Turner F. Currens, Chief of the Proprietary and

Botanicals Sections, with him. This meeting will be an outstanding event for the pharmaceutical industry."

A complete sellout is anticipated and therefore, early reservations are essential.

• AVAILABILITY OF TRAINED MEN

Business establishments engaged in war production are going to be told within the next few weeks where and how they can obtain chemists, engineers, metallurgists and other professional and scientifically trained men, Paul V. McNutt, Chairman of the War Manpower Commission announced recently. He said that representatives of the U. S. Employment Service had been instructed to find out how many employees of this type war production plants require before the end of the year and during 1943.

With this information in hand the Employment Service, Mr. McNutt explained, can draw upon the country's largest registration of technically trained persons, the National Roster of Scientific and Professional Personnel. The roster, to which are now being added the names of the scientifically and professionally trained persons who have registered for military service, has been placed under the direction of the War Manpower Commission. It is the responsibility of those handling this roster, the Chairman said, to analyze and classify the qualification and occupational status of all such persons.

Mr. McNutt explained that the Employment Service would not "raid" the staffs of universities in carrying out this program. The U. S. Employment Service, he, said, will attempt to place only those persons who are now unemployed or not engaged in work essential to the prosecution of the war. "Scientifically trained men and women who are now engaged as educators in colleges and universities are already performing services that may be regarded as vital," Mr. McNutt said. "Industry should not expect to get its technically trained personnel from such sources, although many faculty members have volunteered for war industry work during vacation periods."

"Representatives of the employment offices," the Chairman added, "have been instructed to advise business establishments of the working arrangement which exists between the Employment Service and the National Roster. They will explain that the local employment office is in a position to obtain from it the qualified persons in highly skilled classifications which operators of war production plants may need.

"Government agencies, including the military services and educational institutions, are accustomed to drawing upon this register for technically trained personnel," Mr. McNutt said, "but the survey which was suggested by those in control of the roster will result, it is believed, in its greater use by industry."

Mr. McNutt said that a representative of the U. S. Employment Service has been stationed at the headquarters of the roster to work closely with its staff in filling orders which it is expected will result from the plant-to-plant canvass now being made.

• ADVANCED TO LT. COL.

F. N. Spoerl, formerly of the New England Office of H. W. Butterworth & Sons Co., has been advanced to the rank of Lieutenant Colonel in the U. S. Army Signal Corps. Lt. Col. Spoerl, who was called to active duty in January, 1941, is stationed at Fort Monmouth, New Jersey.

• FAST COLOR SITUATION

"Can I still get fast colors today?—Can I get the shades I want?—Has the War put fast colors on the critical list for the duration?" These, and similar questions are very much in the news today. Many informed converters and retail store buyers are not concerned. Others, however, are inclined to take a pessimistic view of the situation. They seem to believe that if an acute shortage doesn't already exist, one will in the immediate future . . . and are making their plans accordingly. The public is being told that the War has already affected the supply of fast colors in consumer goods. Almost every day advertisements warn the American housewife to expect—and like—fugitive colors in draperies, domestics, apparel, etc.

What is the true situation today? According to S. C. Moody, of the Calco Chemical Division of American Cyanamid, there is no shortage of fast colors today, "provided the dyes are selected to meet specific purposes and uses. For example, dyes selected for a drapery fabric must be fast to dry cleaning and sunlight. A work shirt fabric, on the other hand, must be fast to sunlight, perspiration, and soap and water. Dyes selected for a rayon bathing suit must meet still another set of specifications and be fast to salt water, sunlight and perspiration. In each case the problem is to choose the right dye for each job, instead of going on the assumption that fast colors are equally fast to all types of fabric construction and all types of exposure. That's a good rule to follow in peace times as well as in time of war.

"It is true," Mr. Moody continued, "that certain shades, such as olive drab, are restricted in fast colors due to the enormous concentration of government purchase on these particular shades. As a matter of fact, only 10 dyes out of more than 1500 made in the United States, are affected. Generally speaking, however, the present increased production of dyestuffs, plus lowered production of many civilian fabrics, have resulted in ample supplies of good fast colors for almost every conceivable purpose. If stylists and converters are in doubt about the availability of any particular shade, it's a simple matter to check up in advance with their color resources."

Asked about the advisability of preparing the consuming public against a possible future shortage of fast colors, Mr. Moody replied: "It seems to me that any such policy, however sincere, is opposed to the program of conservation sponsored by the War Production Board. We are all urged to make consumer goods last longer. Applied to colored textiles this means (1) a construction suited to the use to which the fabric will be put; (2) high tensile and abrasive strength; (3) fast colors. Fast colors have 'survival value' . . . they keep fabrics in service longer and are economical in the long run. Barring a sudden and tremendous need on the part of the government, I think that consumers will be able to insist on fast color fabrics and apparel for an indefinite period in the future."

• CHEMICAL SHOW AND PARLEY

Regarded as an important contribution of the chemical industry to the war-time effort, the National Chemical Exposition will be held November 24 to 29 at the Hotel Sherman in Chicago.

Added importance will be given the show, second to be sponsored by the Chicago Section of the American Chemical Society, because of the conference to be held in conjunction to be addressed by leaders of the industry, educators and other authorities. The program is now being arranged by the conference committee.

Victor Conquest, director of research for Armour & Company, who is chairman of the show committee, anticipated an attendance of approximately 20,000 from all sections of the country including research chemists, executives of industrial plants, engineers, purchasing agents, government specialists and others who will be afforded the opportunity of making valuable contacts at the show and conference.

He announces that the transfer of the show from the Stevens Hotel to the Hotel Sherman will be a boon for the exposition, providing adequate space for the display of commercial and educational exhibits and also a location within the loop, accessible to the retail and amusement center.

The shift in location was due to the acquisition by the War Department of the Stevens Hotel, which has become a training school for Army purposes.

● NEW "CROWN" TESTED PLAN

The American Viscose Corporation announced on August 25th the introduction of its new "Crown" Tested Plan under which new minimum requirements are established for rayon fabrics stabilized for construction, size, color and texture for men's wear, women's wear and home furnishings.

Several interesting and important reasons influenced the American Viscose Corporation in bringing out the new "Crown" Tested Plan at this time. These were: (1) To cooperate with the war effort by establishing a set of standards designed to conserve raw materials, man power and factory equipment which might otherwise be wasted in the manufacture of rayon fabrics and apparel of inferior quality. (2) To meet effectively the rising public demand for durable merchandise and honest value by providing stabilized fabrics regardless of price range. (3) To simplify labeling, not only for the information of the ultimate consumer but also for the mutual benefit of converters, finishers, manufacturers and retailers as well. (4) To help the industry in the development and marketing of new, serviceable rayon fabrics to replace those no longer available under wartime conditions. (5) To protect and maintain the public good will now enjoyed by numerous reliable manufacturers and merchants and the American Viscose Corporation as a rayon producer, both during and after the current cycle of a wartime seller's market.

Under the new "Crown" Tested Plan, fabrics by licensees of the American Viscose Corporation and containing that company's "Crown" rayon may be submitted to be tested for fabric stability including fabric strength, seam slippage, dimensional restorability, color fastness, permanence of finish and other qualities where required. Minimum test requirements have been established by the American Viscose Corporation, and are placed at levels which the company believes will assure good fabric performance. Tests are generally conducted in accordance with National Bureau of Standards Reference CS59-41, unless otherwise indicated in the minimum requirements. Additional tests are in accordance with methods which the company believes to be the best available.

The minimum requirements that have been set up are based on research and are determined upon in large measure with reference to the use for which the particular type of fabric is manufactured. For example, the minimum requirements for fabrics to be used in men's sportswear are in many respects widely different from the minimum requirements for fabrics to be used in women's underwear. These specifications are not intended to remain static, but will be improved as often as circumstances permit.

For color fastness to laundering, the laundering test for washable fabrics is conducted at 160° F.; while the test for hand washable fabrics is conducted at 105° F. Dry cleanable fabrics must undergo tests for both the wet and dry procedures. For color fastness to sunlight, sportswear and suiting fabrics are given Test No. 3 of Commercial Standards CS59-41, which requires 40 hours Fadeometer exposure. Women's dress fabrics, for which there were previously no color fastness to sunlight requirements, must now withstand 10 hours Fadeometer exposure under standard conditions. All "Crown" Tested fabrics must now pass the A.A.T.C.C. Test A for atmospheric fading. Another interesting point is that all "Crown" Tested fabrics are to be so constructed and so finished that they can be restored to within 2 per cent of their original dimensions by normal pressing and shaping methods. This factor is determined by a tension pressing method of testing, which was originated by the U. S. Testing Company and developed by interested parties in the industry. Experimentation showed that the testing methods outlined in Commercial Standards CS59-41 do not give accurate information on consumer performance for determining the dimensional restorability on a rayon fabric. For this reason the American Viscose Corporation adopted the tension pressing method instead. Test figures indicate consistent results and provide an accurate prediction as to actual garment performance. In the company's opinion, this method is the best available to determine this factor, which is of primary importance in consumer satisfaction.

● GENERAL RELEASES

General Dyestuff Corp., 435 Hudson Street, New York City, has recently issued circulars describing the following products:

Palatine Fast Blue RRNA-CF—a homogeneous acid dyestuff which is said to possess fastness properties approaching closely those of the chrome colors. It is claimed that the satisfactory fastness properties, level dyeing properties and easy method of application make the product well suited for the dyeing of fast to wearing shades on men's wear and the better grades of dress goods. It is furthermore said to be well suited for the dyeing of loose wool and slubbing, which is to be subjected to a moderate fulling and for the dyeing of various kinds of yarn, especially knitting, hosiery and carpet yarns. It is likewise well suited for the dyeing of fast shades on silk. It is stated that it is of particular advantage in the dyeing of piece goods containing different grades of wool or which have been carbonized. In these cases it is said to produce, together with the other Palatine Fast Colors, more uniform results than can be obtained with chrome colors either by the afterchrome or chromate mordant methods. Circular G-315.

Palatine Fast Green BLNA Conc. CF—the statements concerning Palatine Fast Blue RRNA-CF above also apply to this product. Circular G-314.

● THE STORY OF COMMONWEALTH

The Commonwealth Color & Chemical Company, Nevins, Butler & Baltic Sts., Brooklyn, N. Y., has recently issued a booklet entitled: "The Story of Commonwealth." The booklet outlines the growth of the organization from its inception to its present day standing.

Commonwealth was organized in 1911 in Brooklyn by Ernest S. Wittnebel, an executive of twenty years experience in the chemical business. Mr. Wittnebel undertook the manufacture of chemical specialties and aniline colors with but 6 employees. Within 5 years the textile, leather, and paint and varnish industries had so rapidly expanded their requirements of Commonwealth chemicals that the plant was moved to its present location in order to secure considerably increased floor space. On several occasions since then additional enlargements of working space have been made necessary by substantial increases in the demands of industry for Commonwealth products. In the course of this growth several other concerns have been absorbed into Commonwealth.

Ernest Wittnebel, the founder of Commonwealth, directed the business until his death 6 years ago, when his son, Augustus S. Wittnebel, assumed active management of the concern.

Branch offices are maintained in Chicago, Gloversvile, Philadelphia and Montreal. There are laboratories at Brooklyn, Gloversville, Chicago and Montreal.

The use of Commonwealth products for the following industries are discussed in the booklet: cotton, wool, silk and synthetic fibers, leather, and paint and varnish.

● ETHYL CELLULOSE PLASTIC

New formulations of ethyl cellulose plastic designed to replace rubber have been found suitable for many uses of the now scarce material, Hercules Powder Company announced recently.

Soft formulations of this plastic can be used instead of rubber in gun covers, electrical tape or "friction tape," water tubing to replace brass, raincoats, hospital sheeting, garden hose, and other kinds of rubber hose, mason jar rings, surgical tape, wire insulation, golf balls, baby pants,

gloves, impregnated fabrics, coated fabrics, washers, and footwear. It is also described as resistant to mustard gas.

Ethyl cellulose is now produced by Hercules Powder Company at a plant in Hopewell, Va.

Ethyl cellulose in the form of a soft plastic for these applications is not only a new approach to the rubber problem but a comparatively new development in plastics, most of which heretofore have been hard plastics, the company said.

Ethyl cellulose when compounded with oil and chemical plasticizers in the range of 40 to 60 per cent ethyl cellulose and 60 to 40 per cent plasticizer, produces compositions having many of the qualities which have made rubber applicable to numerous products.

The new plastic formulations, the company said, while not suitable for tires or inner tubes as presently developed, would probably be suitable for rubber applications which before the war consumed 60,000 tons of rubber.

All of the materials required for the manufacture of ethyl cellulose are domestic materials or materials obtainable in sufficient quantities for large-scale production. Raw materials required for the manufacture of ethyl cellulose itself are cotton linters or wood pulp, caustic soda, chlorine and alcohol from natural gas, or from fermentation of agricultural products.

Qualities of the various formulations are toughness, pliability, flexibility, impermeability, and thermoplasticity. The soft type mixtures can be made to retain good flexibility at temperatures as low as minus 70° F., a temperature at which most plastics will shatter like glass upon impact.

Properties which restrict the application of ethyl cellulose are its limited elasticity and lesser resistance to tearing than rubber.

Laboratory tests made thus far upon the material have developed some of its properties which are now available to molders and fabricators. A wide range of properties may be produced by varying the formulations, particularly the plasticizers used. The most likely plasticizers for formulations are animal, vegetable, and some mineral oils as well as the usual chemical plasticizers. Among those tested are raw castor oil, cottonseed oil, Aroclor 1260, Hercolyn D, tricresyl phosphate, Fractol A, Opalwax, Paraplex RG8, corn oil, soy bean oil.

Some formulations have quite good abrasion resistance and tensile strength sufficient for many uses. Water resistance comparable to that of compounded rubbers can be built into these soft-type cellulose plastics.

Resilience ranges one-fourth to one-half that of rubber samples tested. While tensile strength of some of the sample formulations is superior to that of rubber, elongation or stretch of these samples is considerably less than that of rubber. Samples may be flameproofed by the use of tricresyl phosphate, chlorinated diphenyl and chlorinated paraffin.

Two types of ethyl cellulose, N and G, are used in the formulations, the N having 48 per cent ethoxyl content, the G, 45 per cent. The lower ethoxyl content has been found better for injection molded plastics, the higher content better for extrusion molded plastics.

The G type ethyl cellulose plasticized with some plasticizers shows little effect from exposure to gasoline. In general, both the N and G types are unaffected by motor oil. Some formulations show a slight increase in stiffness although not as much as rubber. Strong soap compositions (sodium carbonate) do not harm the plastic. Some formulas are unaffected by butter, indicating it may possibly be used for containers for food products. It is quite resistant to ozone, a property of interest to the electrical industry.

● KARRH JOINS WESTVACO

John H. Karrh, well known in chemical sales circles, has joined the sales division of Westvaco Chlorine Products Corporation, Chrysler Building, New York. For eleven years, Mr. Karrh was associated with the Victor Chemical Works, serving as

JOHN H. KARRH

New York Sales Manager for the past four years. A chemical engineering graduate of the University of Alabama, he previously was foreign technical representative of the Swann Chemical Company of Birmingham in the installation of its processes in European chemical plants.

● RODNEY HUNT CATALOG

The Rodney Hunt Machine Company, Orange, Mass., has recently issued a new 126 page catalog covering their line of textile machinery. It covers their line of "Tru-Shade" Dyeing Machines, "Yankee Clipper" and "Slack-Loop" Washers, "Express" Fulling Mills, as well as soaping machines, wringers, pusher fulling mills and other types of equipment. In addition to illustrations and descriptions of the various types of machines, there is also included considerable new data on dimensions, features and uses of such equipment. A unique feature of the catalog is the publication of 4 full pages of photos of New England scenes which, with one exception, were taken by Rodney Hunt employees. Copies of the catalog are available upon request. Catalog No. TM-42.

● 1943 SPRING WOOLEN COLORS

Playing up the high-spirited musical themes of *Harmonies,* which feature light and medium tone-on-tones, and *Solos,* highlighting lively individual shades, *The Textile Color Card Association* has just released to members the confidential advance swatches of its 1943 *Spring Woolen Colors.*

In commenting upon this advance collection, issued two months earlier than last year, Margaret Hayden Rorke, managing director, explained that its color motif was inspired by Irving Berlin's all-soldier show, *"This Is the Army."* The Spring *rayon colors,* to be issued later, she added, will continue to play up this musical motif in new variations.

Despite the wider scale of their musical theme, all colors in this collection have been carefully chosen, not only for their fashion importance, but in accordance with the Association's established policy of issuing only shades which have been passed upon by its *Dyestuff Advisory Committee.* This wartime conservation measure was adopted by the Association last season. Every shade in the collection is adapted to all woolens and worsteds, wool and re-used wool, wool and re-processed wool, woolen and rayon mixtures and woolen and cotton mixtures.

● DIRECTOR OF SALES

Victor E. Williams, assistant general manager of sales of the Organic Chemicals Division of Monsanto with headquarters in New York, has been promoted to the position of director of sales of the Organic Chemicals Division, it was announced recently by Julius A. Berninghaus, general manager of the division. Mr. Williams will remain at his present location in New York.

Promotion of Frederick C. Renner, assistant general manager of sales of the Organic Chemicals Division of Monsanto, to general manager of sales, with offices in St. Louis, Missouri, also was announced by Mr. Berninghaus.

• NEW RUBBER SUBSTITUTE

A new substitute for rubber in waterproof fabrics which is said to meet specifications for natural rubber and can be handled with the same machinery and processes as rubber has been announced by Joseph L. Haas, technical director and fabric superintendent of the Hodgman Rubber company, Framingham, Massachusetts.

The new substitute is a plastic already familiar to the automotive and glass industries as the interlayer in a safety glass. It is Monsanto Chemical Company's Saflex, one of the group of synthetic resins known as vinyl acetals.

The process for plasticizing and compounding Saflex so that it can equal and even surpass the performance of natural rubber when applied to fabric by conventional "rubberizing" methods was developed by Mr. Haas in conjunction with research chemists of Monsanto's Plastics Division at Springfield, Massachusetts. Both processes and materials are available to other manufacturers, thus enabling the development to serve the war effort as widely as possible.

Saflex-coated fabric, which the Hodgman company has christened Morco-X, has already been made into Army raincoats, hospital sheeting, gas protective fabric, life-preserver jackets and water bags, while many other military items are awaiting final action or are still in the experimental manufacturing stage.

• FLAME-PROOF LIGHTING FIXTURE

A flame-proof fluorescent lighting fixture of moulded asbestos has been approved by the Underwriters' Laboratories. This substitute for steel lighting fixtures, the "Asbestolite," is manufactured by Century Lighting, Inc., (419 West 55th Street) New York City, and is designed for use in industrial "war" plants where complete fire resistance is required.

• SALVAGE COMMITTEE

At a luncheon meeting held August 6th at the Hotel Roosevelt, under the auspices of the Salvage Committee of the Textile Spinning, Weaving and Finishing Industries, and attended by leading representatives of these trades, as well as officials of the War Production Board, Army officers and the press, comprehensive plans were discussed for gathering and disposing waste material for war needs.

The meeting of representatives from the above industries was called by Charles Pinnell, general sales manager of the Merrimack Manufacturing Co., and president of The Textile Color Card Association, who presided as chairman of the Executive Committee and stressed this salvage program as one of the nation's most important jobs, inasmuch as production constituted a most vital factor in winning the war. The fact that this program was for the benefit of our armed forces, he stated, prompted all to bend every effort toward its effective operation.

Mr. Pinnell further pointed out to those present that, upon the success of the cooperation between these industries and the government, would depend largely their chances of procuring supplies needed to run their own plants. Iron and steel scrap and non-ferrous scrap, he added, comprised the most alarming needs of the moment, with rubber scrap next. Right now, he stated, blast furnaces in some sections of the country were facing the serious situation of a shut-down for lack of scrap.

Brief talks were given by Rolland J. Hamilton, Secretary-Treasurer of the American Radiator and Standard Sanitary Corp., who is Chairman of the Industrial Salvage Committee for Greater New York, and Major Thomas Phillips, Liaison Officer between the Ordnance Department in this area and the War Production Board. The principal speaker was R. Merrill Decker, Regional Chief of the Industrial Salvage Section of the War Production Board in this area. Mr. Decker, in presenting a plan of cooperation between industry and the government, emphasized that the salvage and collection of every available pound of scrap metal was a pressing necessity and that the production of iron and steel scrap was particularly crucial.

Mr. Pinnell, as chairman, appointed the members of the Executive Committee, who will direct the salvage campaign. At a meeting of the Executive Committee held after the general meeting, Mr. Pinnell introduced P. S. Anderson, Assistant Regional Chief of the Industrial Salvage Section, to the committee. Mr. Anderson presented each member of the committee with his assignment and explained in detail the duties of each.

The Scrap Salvage Committee of the Textile Spinning, Weaving and Finishing Industries in Greater New York, Long Island, Rockland & Westchester Counties, includes the following branches of the trade: Silk and Rayon Weaving . . . Hosiery . . . Carpets and Rugs . . . Passementerie Trimmings . . . Braids, Fringes, Chenilles and Braided Trimmings . . . Narrow Fabrics, Webbing, Rope, Cordage, Thread and Woven Labels . . . Bleaching, Dyeing and Finishing of Textiles . . . Winding and Coning of Yarns . . . Cotton Goods, Shoddy, Batting and Fabrics not elsewhere classified.

• LUMINESCENCE

The importance of the use of luminescence in its application to war and black-out problems was recently brought out in a statement by Messrs. H. E. Millson and C. C. Candee of the staff of Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J. They said in part:

"Never has this subject been of more interest to the public than under the present emergency. Of importance is the fact that few people realize that there are three distinct classifications in the luminescent field. The first, radio activity, is a phenomenon which is inherent in certain matters. The main war use for this type of material is for instrument dials where cost is a secondary consideration. Phosphorescence is a property which can be applied to some substances and gives them the ability to glow in the dark after exposure to sunlight, ultra-violet light or incandescent light. Fluorescence, on the other hand, is a property which can be applied to practically any material by painting, coating or dyeing and requires a source of ultra-violet light in order to activate it. Fluorescent materials do not have a useful after-glow. The Calco Chemical Division is interested only in the manufacture of fluorescent dyes and their application on textiles and in lacquers, paints, plastics, etc. An extensive study of fluorescence and phosphorescence is constantly being made so that the public may benefit thereby.

"While many people have been under the impression that fluorescence is less handy to use than other forms of luminescence, it is interesting to note that many forms of activating lamps are now available, which require as little as 2½ volts to operate and will show objects within a working radius. As a matter of fact, even with transportation units, a six volt head lamp of the ultra-violet type is all that is needed for the purpose of activating road markings. So extensive has become the use of luminescent materials that one will find in many dime stores packages of luminescent identification markers for sale for a few cents; or one can purchase at the local paint store sufficient luminescent paint to apply on a large barn.

"A danger, however, not generally realized is that a mass of areas of luminescence have high visibility, the same as does ordinary light, and caution should be exercised in using large quantities of these materials out-of-doors. However, even this disadvantage can be capitalized as it is possible to paint the interior of a room with phosphorescent paint and in case of failure of power sources sufficient light will be available therefrom to carry on ordinary activities. Fluorescent tapes can

also be prepared from wool, rayon, nylon, cotton, acetate or other textile fibers for use in outlining doorways, entrances, etc. during black-outs. These can be activated by a minimum of black light, for example, by the use of a 2½ watt Argon bulb in any ordinary 110 volt socket. Special ultra-violet hand lamps and 6 volt storage battery lamps are available for activating fluorescent objects, either during power failures or in places where normal power facilities are not available.

Further information on this subject may be had by writing the Calco Chemical Division, American Cyanamid Company, Bound Brook, New Jersey.

• N. Y. FUND DRIVE

The drug and pharmaceutical and the chemical industries have contributed, to date, $72,053.14 to the Greater New York Fund's 1942 campaign. This has been reported to John W. Hanes, former Under-Secretary of the Treasury and general chairman of the drive, by J. J. Lincoln, Jr., sales manager of the Air Reduction Co., Inc. and chairman of the chemical section of the Fund and by Frank M. Head, vice president of the United Cigar-Whelan Stores Corp., chairman of the drug and pharmaceutical section.

Mr. Lincoln told Mr. Hanes that the chemical industry had contributed, so far, $49,798.10, which compares with a final total of $38,786 in 1941. This year's total, to date, is composed of $44,835.50 in firm gifts and $4,962.50 from employee groups.

The members of Mr. Lincoln's committee are: Paul Hiller of Innis Speiden & Co.; Howard H. Foster of Air Reduction Co.; Howard Berry of Mathieson Alkali Works, Inc.; W. M. Dennis of American Cyanamid Co.; Sumner W. White, Jr., of Mutual Chemical Co.; Charles L. Gabriel of Commercial Solvents Corp.; Robert W. Boggs of Union Carbide & Carbon Co.; John J. Butler, Jr., of Industrial Chemical Sales Co.; J. E. Ferris of Niagara Alkali Co.; A. Lucian Walker, Jr., of Texas Gulf Sulphur Co.; A. R. Ludlow, Jr., of U. S. Industrial Chemical Co.; Charles F. McKenna, Jr., of Commercial Solvents Corp.; Hyman Denker of H. Denker, Inc.; Milton F. Martin of H. S. Industrial Chemical Co.

• NEW DEFENSE COURSE IN TEXTILES

E. W. Ruggles, director of the defense courses conducted at North Carolina State College under the supervision of the United States Office of Education, has announced that the sixth course in Fabric Testing and Inspection will open on September 28 and run for twelve weeks. All expenses except board, room rent, and books are paid by the Federal Government.

Students who enroll in this course will be taught elementary textile design, fabric analysis, fabric calculations, the care and operation of fabric testing equipment, physical and chemical tests for the identification of textile fibers, as well as a study of yarn and fabric defects.

Mr. Ruggles says that this is an excellent opportunity for high school graduates who are now working in textile establishments to lay the foundation for future advancement in textile mills, and possibly to qualify for government service in the Quartermaster Corps as fabric inspectors.

Enrollment in the course is limited to 22, so applications should be sent in as soon as possible.

• ZILLESSEN BECOMES PART OF LOTTE

Zillessen & Son, Inc., of Paterson, N. J., have announced that, as of September 1st, they will become a part of the Lotte Chemical Company, Inc., 109 Fifth Avenue, Paterson, N. J.

They state that they shall be able to offer to the textile trade a complete line of chemicals in addition to their usual line of soaps and dyestuffs.

Their new telephone number will be SHerwood 2-0704.

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• MORPEL KNITWAX 60

The Morton Chemical Company, Greensboro, N. C., announces a new high melting synthetic wax that is said to be soluble in ordinary petroleum solvents and also to be aqueously emulsifiable. It has been tried in the plants of several of the leading Southern knitters for the past months and, it is stated, due to successful results, it is now being placed on the market in a new beaded form, which contributes to the ease of handling. The experimental work had been done on slabs.

The usual method of application is to make a 5 per cent solution of the wax in ordinary petroleum naphtha and then to apply this to the yarn either by soaking and extracting the skeins or by running the yarn over an emulsion roll where it is applied very readily. It can be applied to skeins or packaged yarn before throwing or to the yarn after throwing, and then the twist can be set either by steaming in the usual steam cabinet or simply by heating for 30 minutes in a hot box at a temperature of about 175° F. It is claimed that reports indicate a great increase in knitting efficiency through the lowering of press-offs and seconds and through the production of a much smoother fabric. It is further claimed that cones retain proper condition indefinitely as the coating is of a water repellent nature and is not dependent upon moisture for the proper conditioning of the yarn. It is stated that the product is easily removed in the finishing by the use of an ordinary alkaline scour.

Milton R. Radcliffe is now associated with the Morton Chemical Company in their laboratory and will devote his entire efforts to research. Mr. Radcliffe is a graduate of Rutgers University and has had wide experience in the trade, having been associated with duPont for some years and just recently having been chief chemist for the Raolin Corp., Easton, Pa., manufacturers of chlorinated rubber and kindred products.

• FIRE PREVENTION WEEK

Fire Prevention Week has been designated as October 4-10 by Presidential Proclamation. In this proclamation, the President called upon the nation for observance of this occasion as part of the war effort and charged the U. S. Office of Civilian Defense, which is responsible for civil protection in wartime, to assume leadership in the observance.

Fire is always serious, but now, as the President pointed out in his proclamation, every loss of life, every interference with production, and every loss of critical materials delays victory. Fire Prevention

Week affords an opportunity to impress all the people with the present urgency of protecting our resources against destruction by fire.

Everyone is urged to participate in fire safety activities in their homes, places of employment and communities. Fire Prevention Week campaign material may be obtained from the following sources: National Fire Protection Association, 60 Batterymarch Street, Boston, Mass.; National Board of Fire Underwriters, 1014 Merchants Exchange Building, San Francisco, Calif.; 85 John Street, New York City, and 222 West Adams Street, Chicago, Ill.; Chamber of Commerce of the United States of America, Insurance Department, Washington, D. C.

Recent Improvements In

FINISHING MACHINERY DRIVES

C. H. S. TUPHOLME

MANY of the machines used for finishing textiles require speeds adjustable to the properties of the fabric being worked on, and to the process employed. Generally, it is sufficient if the speed of the fabric is variable in a range ratio of 1:3; however, it frequently happens that bigger regulating ranges are necessary in printing machines, as, for example, up to 1 to 10.

For the variable-speed drive of such textile finishing machines, individual electric drive is being increasingly adopted and as three-phase current is generally the only form of power available, the three-phase shunt commutator motor is the one commonly used.

Load variations have almost no influence on the working speed adjusted to. Thus, the speed of the fabric passing through calenders, tenter frames, etc., remains constant, if the brush setting is not changed, whatever the roller pressure, width and stretching of the cloth. As no additional apparatus is necessary, the layout is simple and compact. Due to entirely automatic pushbutton control, operation of the plant is of the simplest. The operator can devote his whole attention to the supervision of the machine and observation of the process.

Expensive mechanical regulating devices which are not always accurate can be eliminated when electric variable-speed drives of this type are used, not only in the case of individual drives but also in the case of composite machines with several working shafts. Each shaft is provided with its own driving motor and the requisite co-ordination of the speed of the different motors is maintained by very simple means. It is not a question of adjusting all the motors to exactly the same speed. Very often it is necessary that certain differences in speed of the motors be maintained in order to take into account the processing operation, as for example a certain shrinkage of the fabric and to ensure smooth delivery of the cloth. A so-called compensator is a simple device to obtain smooth running. This is composed of a simple frame with two guide rollers and a jockey pulley which is guided on two rails. If one machine in the series is delivering too much, or too little, cloth, the jockey roller falls or rises. This movement can be utilized to control the speed regulation of a shunt commutator motor.

An interesting tenter frame drive by two shunt commutator motors has recently been installed. The main motor drives the tenter frame and carries a small servomotor for electric remote control of the brush rocker. Its housing contains the necessary auxiliary and end-travel contacts for the interlocking of the drive with its switching apparatus.

The second variable-speed motor drives the wringer which precedes the tenter frame; this motor is automatically controlled and regulated by the compensator through a chain transmission. The chain drive is so designed that the zero position of the brush rocker corresponds to the lowest position of the jockey roller and the maximum brush displacement (highest speed) to the highest roller position. A rise of the jockey roller means an increase in motor speed while a lowering means a drop in motor speed. The end-travel contacts as well as the closing contact for the contactor of the supply system are lodged in the motor and are actuated by the brush rocker.

When the machine is at a standstill the compensator is always in its lowest position. Only the main motor is controlled by push-buttons, while the drive of the wringer is always switched in, adjusted and cut out automatically by the movement of the jockey roller. For starting the tenter frame, the operator has only to depress the push-button "In." If he wants to alter the speed of the fabric, he uses push-button "Faster" or "Slower." When stopping by means of the push-button "Stop" the main motor is cut out, the wringer motor runs on until the compensator has reached the lowest position, whereupon this drive is cut out by the built-in end-travel contact. The connection permits running the two motors independently of each other.

For the auxiliary drives of the tenter frame, for width

adjustment, fans feeding-in apparatus and air pump, no regulation is required. The width adjustment can be controlled by push-buttons from the operator's post and all other drives are controlled by simple hand switches.

Electric variable-speed drives of this type can be utilized profitably in the finishing industry by forming a group of separate machines which succeed one another in the process, the group having a continuous fabric track.

In dyeing hank yarn by hand, the fabric is placed on rods and is drawn to and fro through the dye trough. After this the hanks are raised from the trough to drip and dry. The manual labor entailed takes up much time and requires two men per dye trough and can be better performed by the hand yarn dyeing machine. In this the material to be dyed is suspended on yarn holders which rotate slowly in both senses; alternatively, it is immersed in the dye by the downward movement of the varn holders and is moved to and fro in the dye, being raised from the trough when the dyeing process is finished.

So that the hank yarn dyeing machine can meet the manifold requirements of practical dyeing, such as simultaneous dyeing of different hanks in different colors on the same machine the yarn holders of the machine (which is usually of considerable length) are grouped together in independent sets and the dyeing trough is then subdivided accordingly. This subdivision, however, requires separate drives for the yarn holders and separate raising and lowering devices for each set with numerous bevel reversing gears and complicated shafting which is often difficult to arrange.

To overcome these difficulties, hank yarn dyeing machines have been developed with electrical sectional drive. Each set of yarn holders has its own yarn-holder motor and raising and lowering device motor which are located directly on the working site, thus dispensing with shafting and conical drives.

The yarn holder driving motor is a multi-slot unit with interchangeable number of poles, giving two speed steps. It is carried on the yarn holder traverse and is raised and lowered with it. The switching devices of the yarn-holder drive are placed just beside the motor. The reversing switch is driven through a simple ratchet-wheel mechanism from the drive of the yarn holder. The two control rods projecting from the yarn holder-traverse towards the service side of the machine permit disconnecting the reversing switch from automatic service in order to allow reversing the yarn holders rapidly several times in succession, which process is intended to obtain equalization and also to facilitate changing the speed of the yarn holders. Apart from the two speeds attained by interchanging the number of poles, a mechanical reversing gear permits setting two other yarn holder speeds.

The raising and lowering motor has also interchangeable poles with two speed steps. It is carried above on the guide frame of the yarn-holder traverse. The switch gear, pole change-over switch and reversing contactor are also placed just beside it. The pole change-over switch is controlled by the control rod, projecting above, from the raising gear towards the service side. However, it is only necessary to actuate the push-buttons provided in boxes in front of each set at the point of control in order to raise, lower or hold the yarn holders in any desired position above the dyeing trough. End-travel switches define the lowest and highest positions of the yarn-holder traverse. If several or all the yarn-holder sets are to be controlled at once, as occurs for instance if a big quantity of hank has to be dyed in the same way, rotary switches under the push-button boxes have to be adjusted. The raising and lowering mechanism can then be controlled from any of the push-button boxes.

In order to give the oscillating movement to the material being dyed in the dyeing trough this machine is equipped with an oscillating movement device so that its action follows the manual process. Rods are passed through the yarns suspended on the yarn holders, which rods are carried, at the back, in a support which can be displaced horizontally. This rod support is given a to-and-fro movement through the action of an oscillator with crank drive. This causes the hanks to be opened and closed alternately, as in manual dyeing, and to be moved through the dye bath.

The oscillating motion device is driven by the raising and lowering motor. After the yarn holders have been lowered to the best working position for the dyeing process, the raising and lowering motor is switched over to the oscillating mechanism by means of one of two levers located below the push-button boxes. The eccentricity of the oscillations can be modified by one of these levers in order to increase or decrease the travel of the oscillating rods, according to requirements.

All the vital driving mechanisms, the motors and the switchgears are located above the dyeing troughs and in the rear, in the machinery frames and are protected against spray water. Motors and switches are of the totally-enclosed type. The main and control leads are in armored tubes or of cable of damp-proof insulated design to ensure service reliability and long life of the machine.

By the subdivisions of the drive between several motors, which work directly on the different parts of the machine doing the work, and also by the introduction of electric control, it has been possible to evolve a machine suitable to the rapidly changing working conditions of dye works.

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Washing—

(Continued from page 426)

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•CLASSIFIED• ADVERTISEMENTS

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $6.25 per column inch or less per insertion.

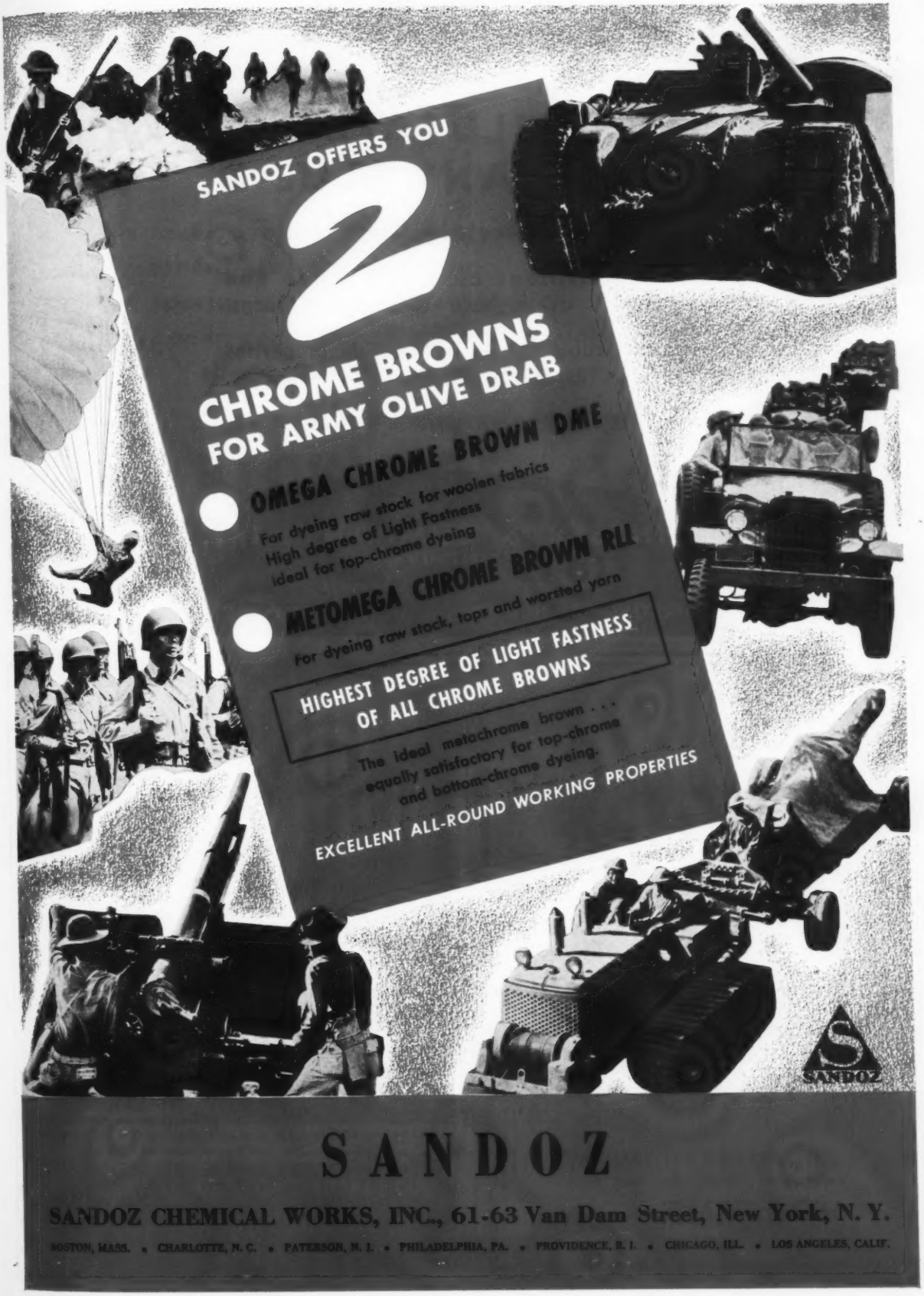
WANTED: Plant man with chemical training and experience to serve as assistant in charge of production in established southern plant manufacturing wet-processing agents and textile specialties. State age, experience and salary expected. Write Box No. 397, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Textile Colorist. Capable of making and matching of shades for hosiery industry. Past employment—sixteen years as foreman dyer for second largest hosiery mill in south. Willing to prove my ability as dyer for thirty days at my expense. Experienced in dyeing and finishing of pure silk, rayon, cotton, nylon and mixed fibers. Draft status 3-A. Write Box No. 398, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

ENGINEER—Eastern manufacturer of recording control instruments desires to employ a textile application engineer. Applicants should be familiar with the practice and theory of weaving and finishing mill processes and with the construction and use of available instruments and control devices. Must be capable of visualizing needs for instruments and devices not yet available. A good education in physics or in chemical engineering considered essential. Applicants must be U. S. Citizens. Reply to S-12, P. O. Box 3552, Phila., Pa.

WANTED: Textile chemist and colorist with basic training in chemistry who is qualified to match shades in a dyestuff laboratory on all types of fibers and fabrics. The concern is a large dyestuff manufacturer, position in New England. In reply give full particulars of training, experience, draft status and salary desired. Write Box No. 399, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

COLORIST WANTED: Mid-West manufacturer making broad line of dyestuffs is anxious to secure the services of a colorist to assume complete control of the dye-testing laboratory. Applicants must give complete information about themselves in first letter. Our employees have knowledge of this advertisement and all applications will be treated in strictest confidence. Write Box No. 400, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.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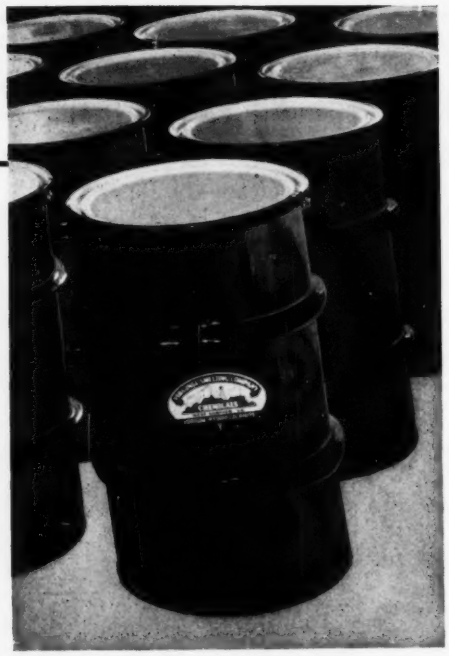

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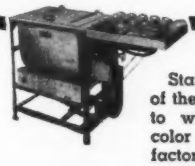

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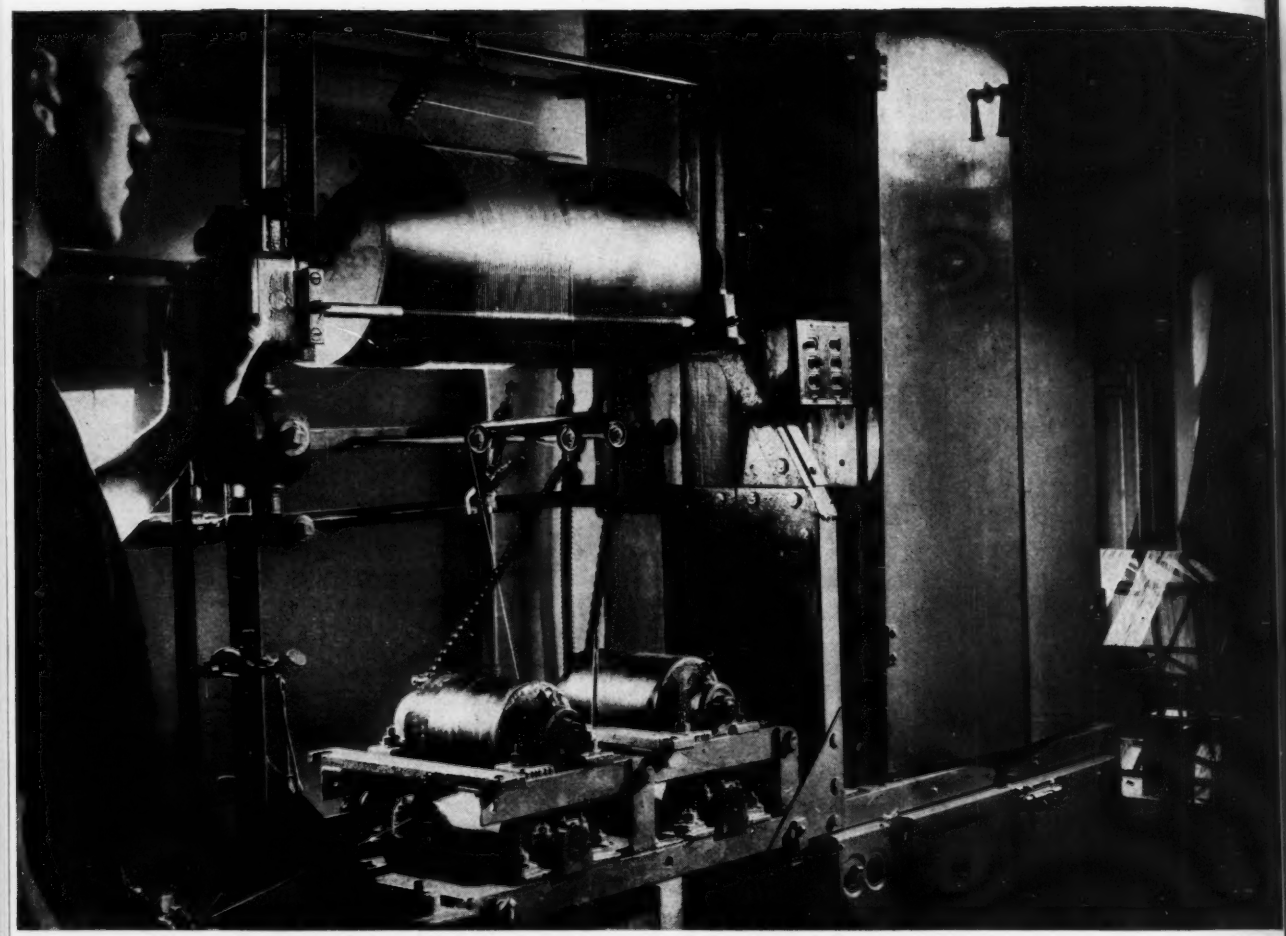

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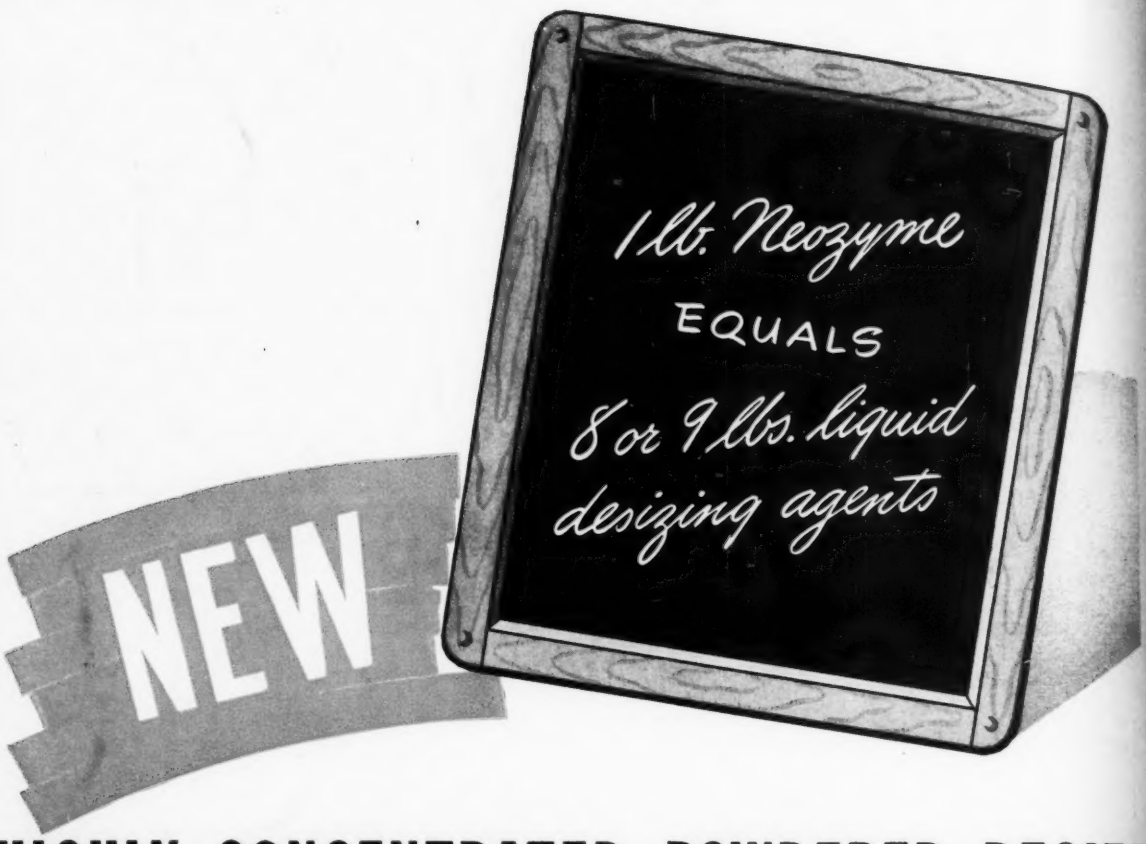

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